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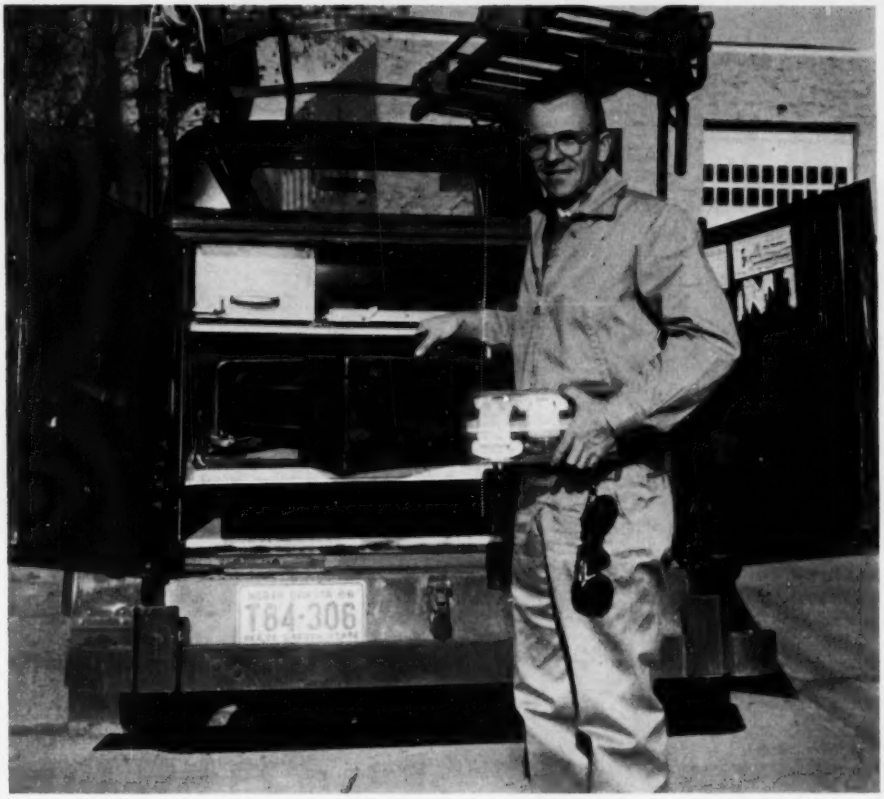
Telephony

THE JOURNAL OF THE
TELEPHONE INDUSTRY
SINCE 1901



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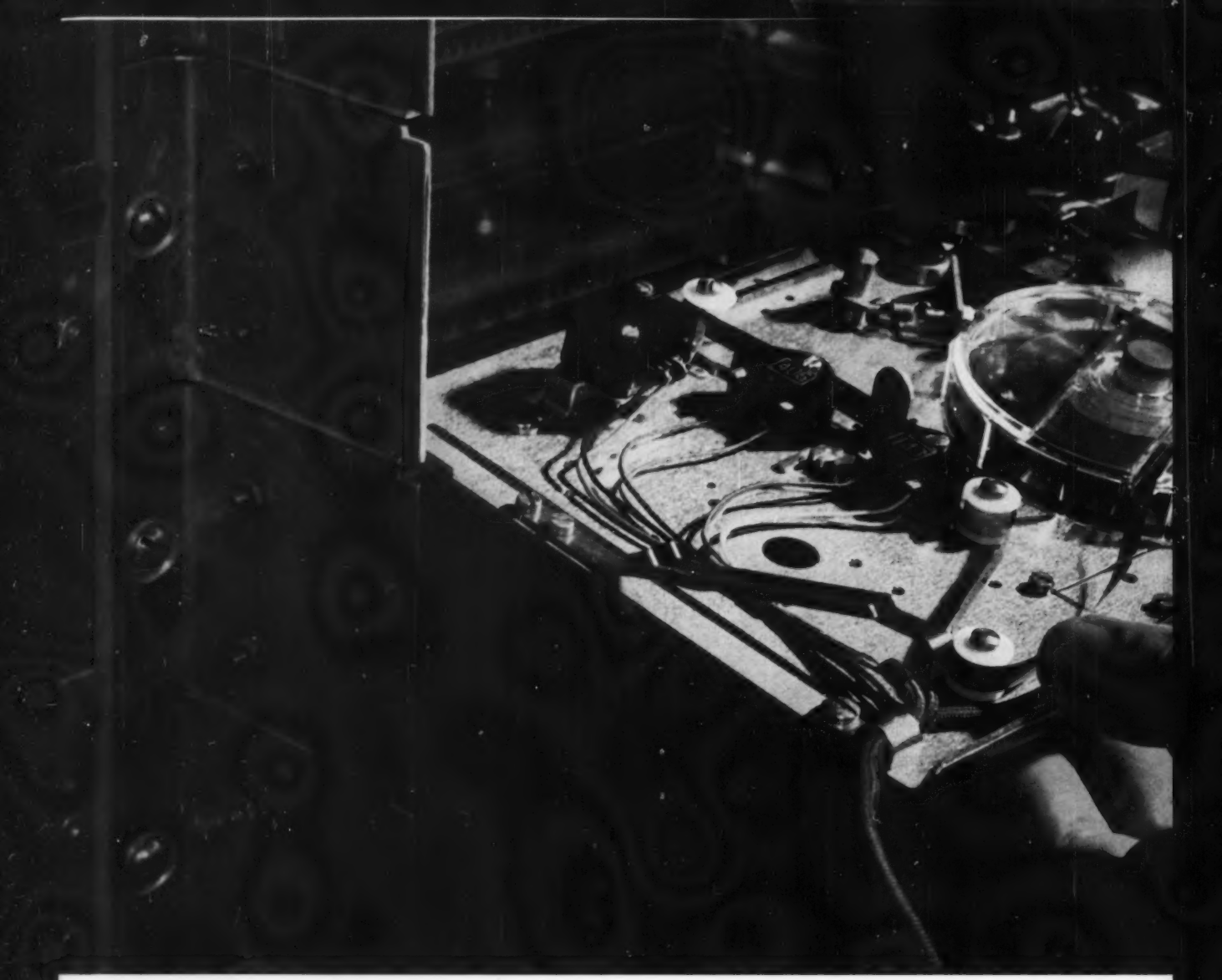

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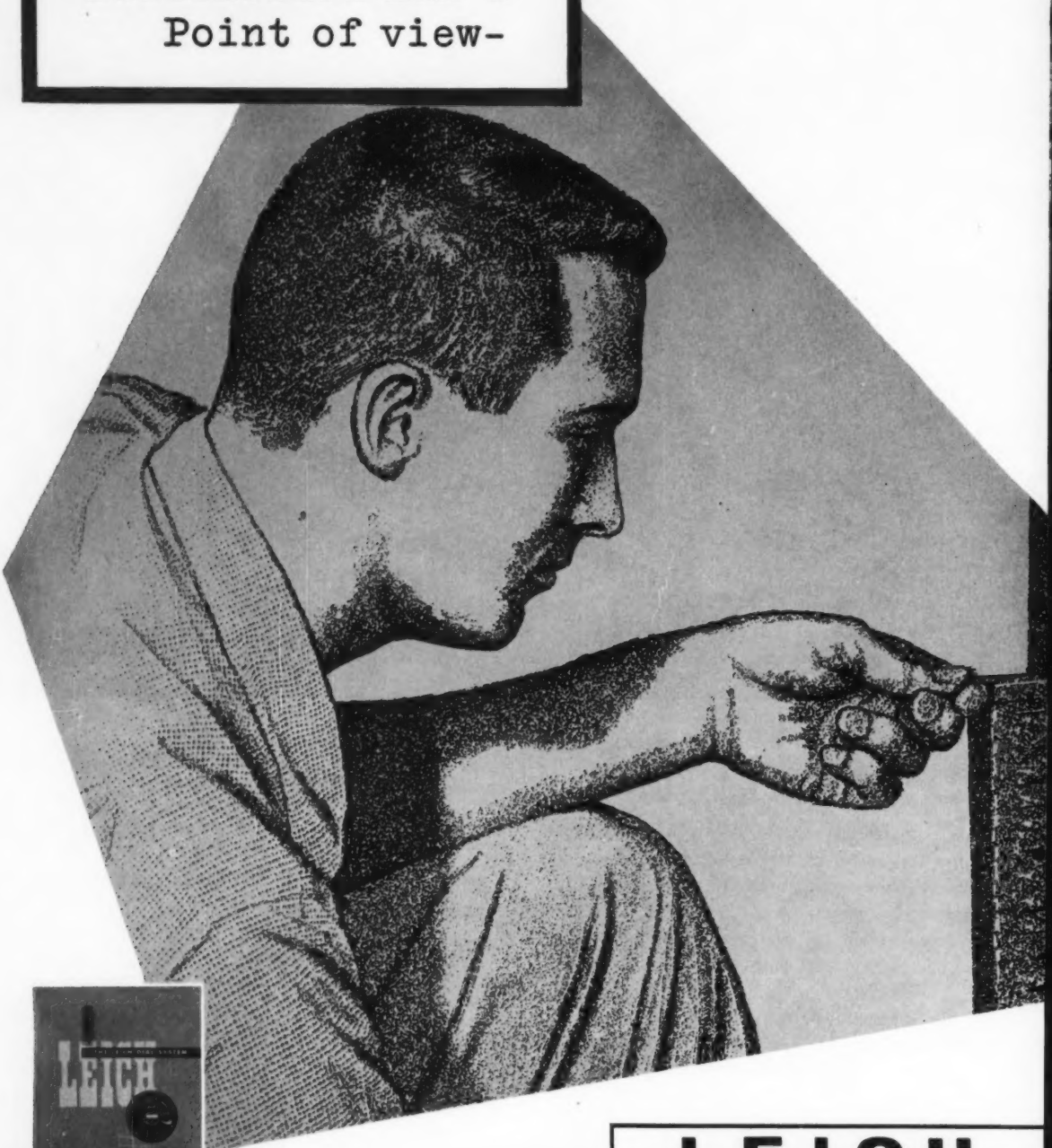
Point of view-



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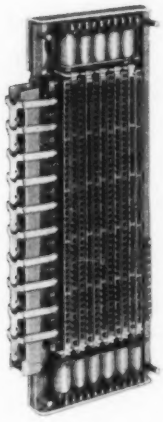

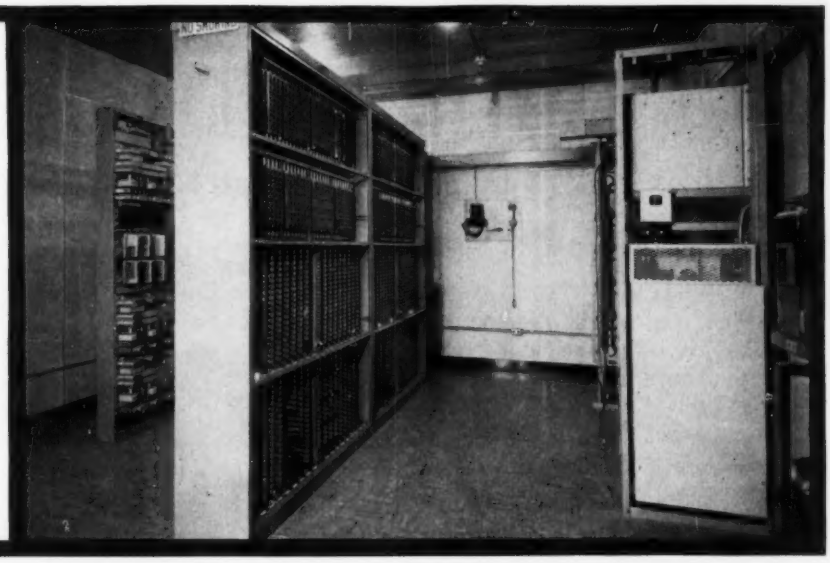

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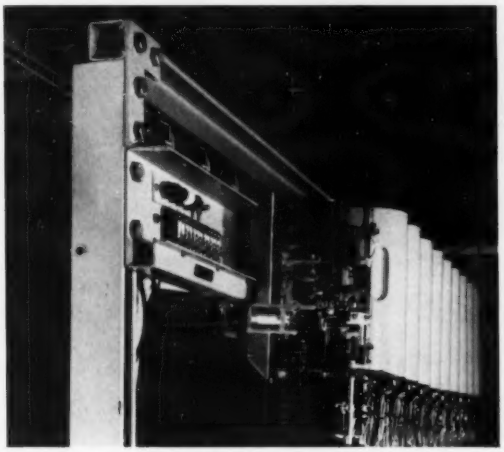
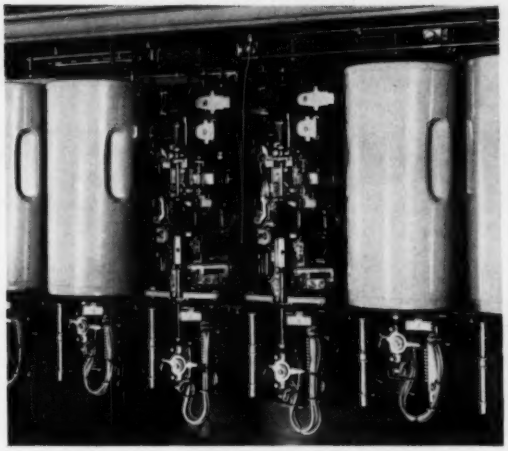
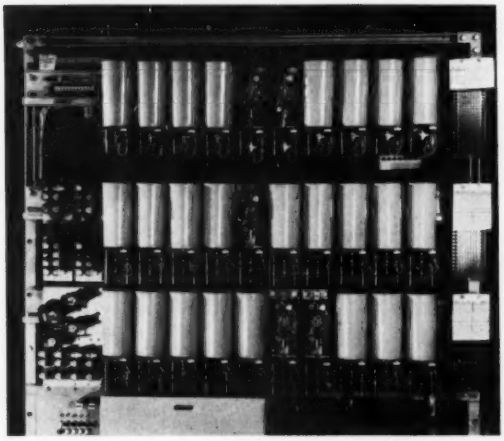


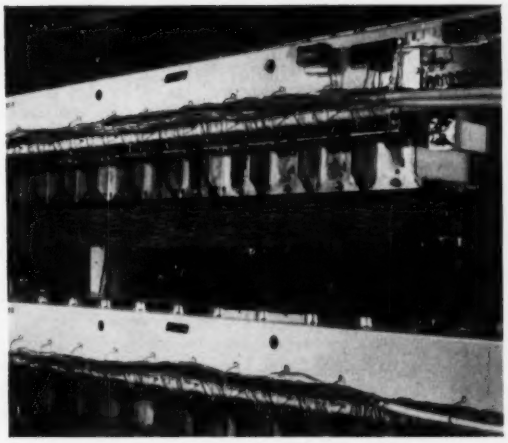
1—Bay framework lighter. Built up from Unistrut frames that permit any shelf arrangement. Framework smooth-finished, easy to maintain, durable, modern looking. Made from cold drawn steel.



2—Simplified circuit design cuts number of relays in all selector switches. Marked by vertical bank instead of post bank; simpler digit absorbing. All selector switches have faster-than-normal operation.



3—Linefinders also feature simplified design, with number of relays reduced to two and vertical bank eliminated. Automatic self-checking of linefinder and control circuits.



4—Superior wiring: insulated with a semi-rigid polyvinyl chloride covering. Line circuits are mounted on fiberglass bars; shelves are strap wired: no excess wires except those needed for future growth. Solderless, automatic wire wrapping on terminals and relays.

FLASHES AND PLUGS

PERCHANCE TO DREAM. A British bed maker has just unveiled to the business men's market its latest achievement—a super bed. This piece of equipment comes with tape recorder, telephone, intercom system, electric razor, automatic tea-maker, radio, and pushbutton lights.

There are controls for opening and closing the bedroom curtains, and for raising either end of the two single mattresses attached to the double headboard.

A weary businessman may enjoy the luxury of the mink spread, and 'tis said, it is possible to sleep in the gadget.

•

SITTING DUCK. An engineer at Southwestern Bell Telephone Co. is a duck hunter. One day he noticed that when his decoys moved in the water, they appeared to be more attractive to real ducks.

He got an idea, took out his slide rule, and after a little figuring put together a few stray parts from his work shop and—voila.

The engineer had created Herman, the transistorized duck decoy!

A small transistor radio inside the decoy controls two toy electric motors—which push Herman through the water—and a rudder to steer him. The engineer controls Herman's movements from a small transmitter on shore.

Now we imagine, there's a new problem. How can the engineer be sure other duck hunters will not be fooled by the decoy's realism and blast Herman—tail over transistor—out of the water?—*Indiana Telephone News.*

•

PLENTY OF NOTHING. A subscriber to Dun & Bradstreet, the credit rating guide, was baffled the other day when he received an envelope from the company with nothing in it. He telephoned Dun & Bradstreet to ask what they had in mind.

"How would we know," said the young lady who answered his call, "if there was nothing in the envelope?"

•

EARLY TO RISE MAKES YOU TIRED. It seems a young couple named Thompson moved from the city to a farm and found it slightly hard to get adjusted to their new routine. A case in point occurred one Monday morning when the alarm clock, set for 5 a.m., went off and Mr. Thompson got up and dressed, milked the cows, did a few other chores and was eating his breakfast when he noticed the alarm clock did not agree with other clocks in the house.

His wife called the telephone operator for the correct time and discovered it was 2:45 a.m.

The disgusted Thompsons went back to bed.

CHANGE OF ADDRESS

Please notify your local postmaster and the Circulation Dept. of TELEPHONY of change of address. Change cannot be made without the old as well as the new address. Allow three weeks for change of address to become effective.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

January 31, 1959

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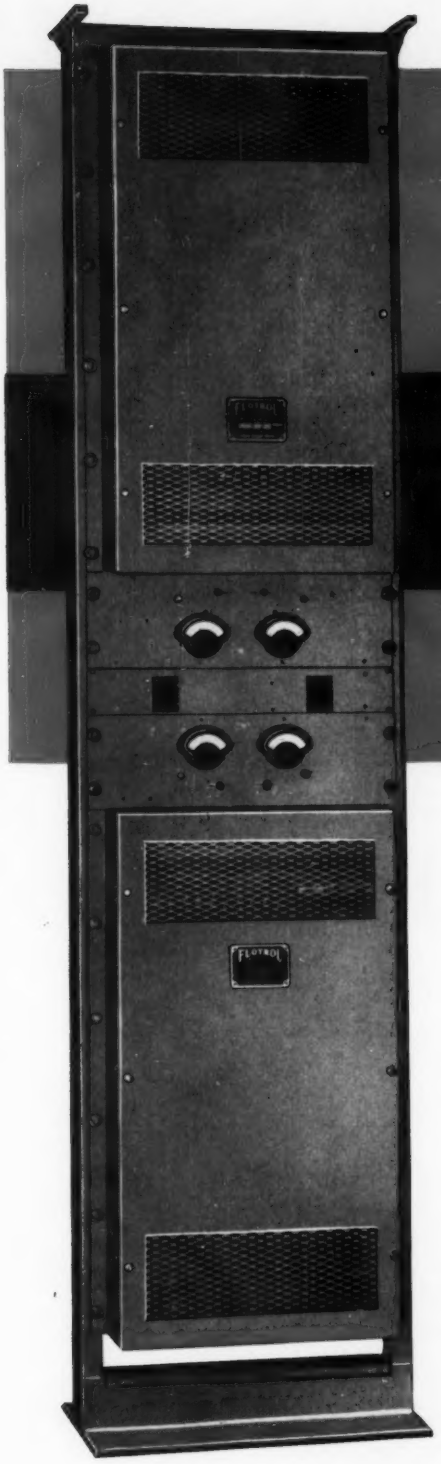

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The Lorain Dual Flotrol Battery Charger Assembly consists of two complete Flotrols mounted one above the other in a standard 23″ relay rack. The upper unit is inverted to bring all meters and controls to eye level, along with easy-access input and output leads. Total floor space: 24-3/8″ x 15″.

The two chargers can be used either individually, or continuously in parallel. In addition, an automatic control panel (optional) allows either Flotrol to be selected as the primary charger with the second unit automatically operated in response to load demands exceeding the capacity of the primary charger.

Maintenance work or replacement of either unit leaves the other in service.

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Single-phase Duals offer a range of outputs from 24 to 48 amps. (input 230 or 115 volts, 60 cycles). Three-phase Duals cover 50 to 100 amps. Capacity of a Dual unit of less than maximum rating can be increased at any future time by substituting a larger Flotrol for either unit.

Lorain Dual Flotrols are offered in many combinations of chargers, controls and accessories. You can buy complete assemblies or any part you require. Get the full story.

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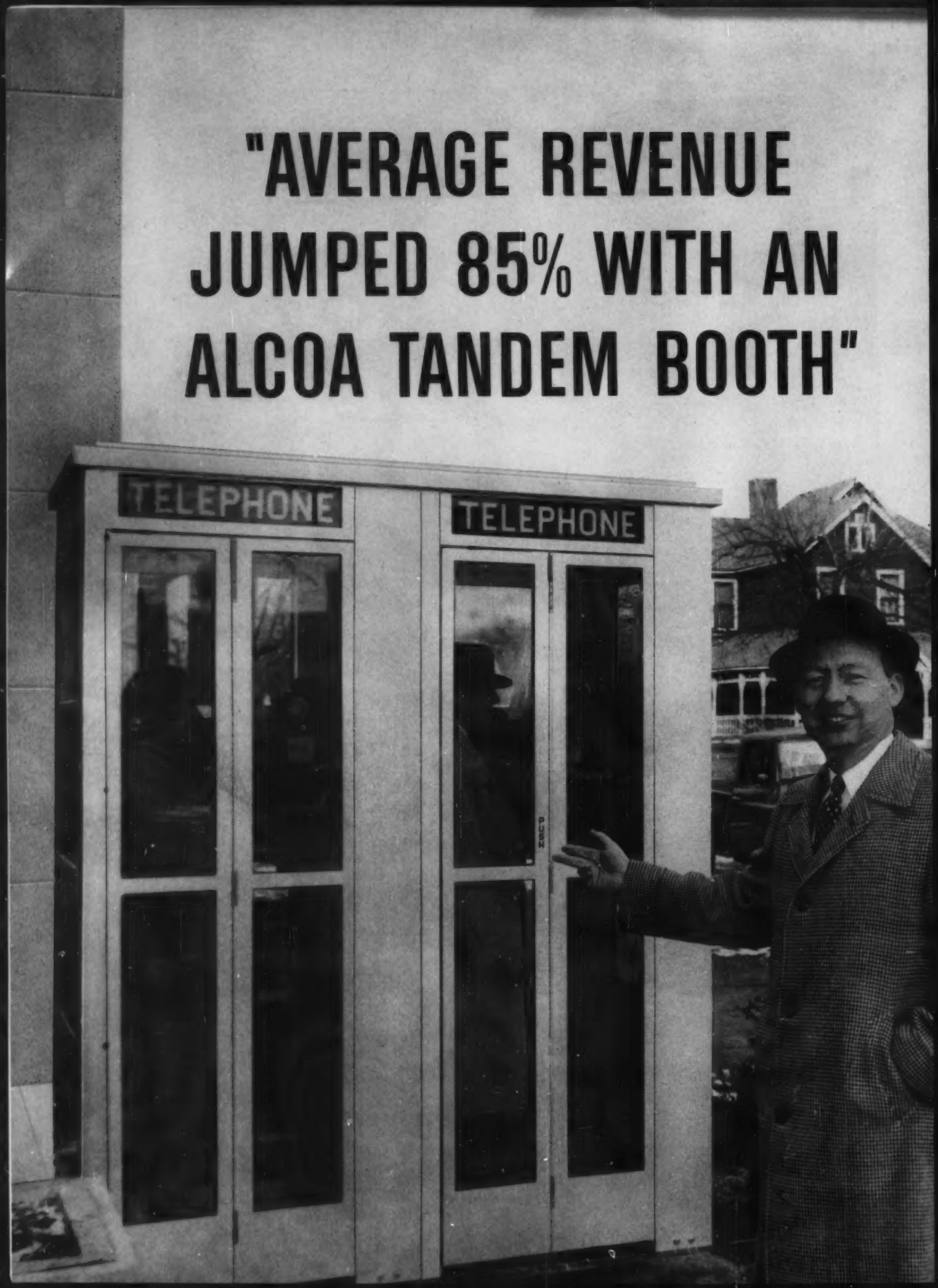

"AVERAGE REVENUE
JUMPED 85% WITH AN
ALCOA TANDEM BOOTH"
TELEPHONE
TELEPHONE

reports F. J. Eherenman of United Telephone Company of Indiana

"Early last year, we replaced an ordinary single booth with a new Alcoa tandem assembly and noticed an immediate increase in revenue," says F. J. Eherenman, General Commercial Supervisor of United Telephone Company of Indiana, Warsaw, Ind.

"We had noticed customers standing in line to use the single booth in front of our business office in Franklin and considered placing another booth along side it. But we decided to install an Alcoa® Aluminum tandem assembly for three big reasons: (1) aluminum's clean, good looks and solid construction blend well with our new, modern exchange building which just opened in January, (2) cost of painting every three or four years is eliminated, and (3) the tandem booth requires less space than two single booths, takes a minimum of sidewalk area.

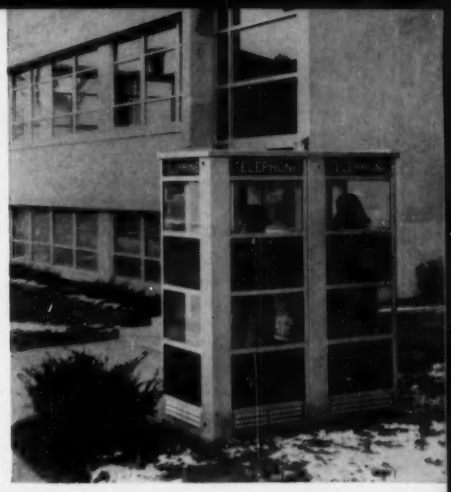
"In the first seven months of service the Alcoa tandem assembly has more than paid its way. Revenue has soared from the previous installation to an average increase of over 85 per cent. It's quite obvious that our customers also like Alcoa booths."

ALCOA GOODWILL KITS

Here's a big extra you get with every Alcoa booth. These FREE kits contain newspaper mats, publicity releases, envelope stuffers, radio and TV commercials—everything you need to tell customers about the added convenience of booths of Alcoa Aluminum.

For more information on Alcoa booths, write for brochure. And ask your jobber how Alcoa booths can increase your revenue and build customer goodwill. Aluminum Company of America, 1720-A Alcoa Building, Pittsburgh 19, Pennsylvania.

F. J. Eherenman, General Commercial Supervisor of United Telephone Company of Indiana, points to the two features of the Alcoa tandem assembly he likes best: the clean, bright appearance that attracts customers and the sleek, compact construction that blends well with the modern architecture of the new Franklin exchange building.



"Notice how neatly the Alcoa tandem booth fits into a minimum of space in front of our new building," says Mr. Eherenman. "Notice, too, how its clean, modern lines make it almost a part of the building because it blends so well with it."

"We erected our Alcoa tandem booth without difficulty," says Supervisor Eherenman. "Easy-to-follow assembly instructions came right with it, and two of our men had the whole job done in a few hours. The Alcoa tandem booth is more compact and has no hard-to-clean gap between the booths. It's strong, too, and both weather- and vandal-resistant."

Old Installation Single Booth	Revenue	New Installation Alcoa Tandem Assembly	Revenue
November, 1957	$ 92.75	March, 1958	$112.60
December, 1957	89.90	April, 1958	125.10
January, 1958	88.10	May, 1958	181.60
February, 1958	103.55	June, 1958	183.00
		July, 1958	174.25
		August, 1958	253.90
		September, 1958	199.30
		October, 1958	155.35

"It's easy to see how monthly revenue jumped immediately after the installation of the modern Alcoa tandem booth," reports Mr. Eherenman.

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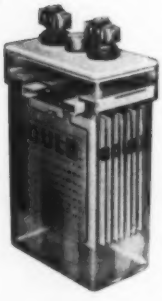

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Always Use Gould-National Automobile and Truck Batteries

More Power to you from Gould

Keeping Our Business and Politics Straight

THERE HAS BEEN much agitation of late for business leaders "to get into politics" in order to protect the American private enterprise system from anti-business attacks of left-wing politicians and to offset the direct partisan political activities of labor union leaders.

We think this is dangerous philosophy for the business community, especially so for utilities. Instead, the advice given by President F. R. Kappel of the American Telephone & Telegraph Co. in a recent address before the Bond Club of New York (see address on page 21) seems to us to be the better course for business to follow in protecting private enterprise against attacks by politicians or "political" groups.

Mr. Kappel recommended that business do the best possible job for the people they serve and, more important, see that the people and their representatives in government are directly, fully and honestly informed "about what business is trying to do." Furthermore, he said if business is given treatment it thinks is wrong or shortsighted, it must say so and say why—and never stop working "to get the situation corrected."

"While I am dead against corporations engaging in partisan support of candidates, I certainly think we should do the most we can to discuss policies and issues and call attention to their impact," Mr. Kappel said. He made it clear that he saw every reason for encouraging people in business to engage in political affairs, *as individual citizens*, and no possible reasons for discouraging it.

The same general philosophy was expressed by the editor of TELEPHONY, as long ago as 1956, in an address he presented at state telephone conventions, entitled "Let's Keep Our Business and Politics Straight."

Warning telephone companies against engaging in partisan politics, our editor said:

"There is no such thing as a Democratic utility or a Republican utility. Any telephone company, as a utility, has an obligation by law to serve all customers without the slightest discrimination as to race, color, creed, or politics."

However, he declared that it becomes the clear duty of telephone company management and its employes to speak up in defense of the very economic system under which the company operates. And, he said, when, unfortunately, that system itself happens to become a political issue, then management may very well find that it has a definite responsibility along this line.

Speaking further on the matter of protecting private enterprise, our editor said:

"And so, we see that the sound, traditional managerial policy of striving to keep business out of politics, and to keep politics out of business, is subject to the very obvious qualification of self-preservation. It is only when the continuation of a business, particularly a utility business such as a telephone company, may be imperiled by unfair and distorted attacks that it becomes good business policy to set the public record straight. In other words, in such a situation, business management must consider itself as the trustee of our enterprise system. It has a responsibility to the public, to the company's employes and customers, as well as to the investors, to speak out clearly and unmistakably when that system becomes a target of political persecution."

Emphasizing that the best technique to protect our way of life is to make a clear presentation of the economic facts upon which our American system is based, he said:

"There is no need to argue or bicker with those who slander our system of private enterprise. There is no need for the *negative* approach, of a mere defense from political attack. The facts are there to speak for themselves in a positive way. The positive way is to spread the record of American businesses, including, of course, our public utility industries."

Today, we hold the same opinion as we did in 1956—that in the telephone industry, this job of upholding our private enterprise business system, must be started within the industry, by spreading the word first among our management people and employes. If this is done they, in turn, will be better able to carry the story to the level of our subscribing public.

(Please turn to page 38)

IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Eisenhower announces in budget message that the government would like to get out of long distance telephone business in Alaska. Recommends that railway unions, worried over loss of passenger business, take a look at action of hatters union to save hat business. FCC issues report.

THE TELEPHONE industry has some reason to be assured over the announcement in President Eisenhower's fiscal 1960 budget message that Uncle Sam would like to get out of the long distance telephone business in Alaska. But, a careful reading of Ike's text, plus a realistic appraisal of the telephone set-up which already exists in Alaska, suggests that there is plenty of room for caution—lest the baby state become the hatching ground for more public ownership in the telephone business than exists in all the rest of the 48 states. Alaska already has that; due mostly to a default of private investment during difficult pioneering days when government authority was the only way telephone service could be established in early settlements of the frozen northland. This historical development is quite understandable and nobody's fault.

President Eisenhower's message on Jan. 19 said that he intends to ask Congress to authorize the sale of the federally owned long-line communications system in Alaska. He made the announcement in his fiscal 1960 budget message. He said that, now that Alaska is a state, it should have a communications facility which will be "more responsive" to the growing needs of its expanding economy and new governmental status.

The President said the system *should be developed by private enterprise!* The army, air force, and commerce departments presently operate Alaska's long distance communications system, generally known as ACS (Alaska Communications System), the only long-line service in the former territory.

The government-operated facility provides the sole telegraph, telephone, and radio contact between Seattle, Wash., and Alaska and from one city to the other within the new state. Alaska does have privately operated telephone companies in its various cities, but it also has many more municipally owned facilities, plus an REA co-op, as we shall see. A citizen who wants to make a telephone call to another city or to another state has to use the federal facility, ACS. Let it be said that these Alaskan municipal telephone plants are well-run establishments, operated by efficient people dedicated to public service. The problem is not one of criticism of what has been done in the past; but what will be done in the future. Will public ownership in Alaska expand and take over more facilities?

Congressional hearings have been held in past years on various proposals to get the government out of the communications business in Alaska, but they have never resulted in any successful legislation. President Eisenhower said he will make his recommendations for specific authorizing legislation "soon."

The budget, in several other instances, reflected the added responsibilities that Alaska will have to take on as a new state. The President made no individual requests for funds to operate such standard Alaska budget items as the mental health program, airport operation and maintenance, and the highway program.

President Eisenhower said he will ask Congress later to make a supplemental appropriation of 10.5 million dollars to keep these projects going during Alaska's transitional period. But the Chief Executive made it clear that Alaska will have to begin assuming many responsibilities previously handled from Washington, D. C.

Now the fact is that the two largest Alaskan cities are at present served by municipally-owned and operated telephone systems: Anchorage, with about 16,000 stations, and Fairbanks, with about 6,000 stations. There is also a small municipal telephone system at Cordova (350 stations). And, Alaska's first REA telephone co-op—Matanuska Telephone Association, Inc.—serves the city of Palmer (750 stations). There are also substantial private company operations; notably, in Juneau (about 4,000), Ketchikan (about 3,000), and a jointly-owned company operation in Kodiak and Sitka (about 1,300). But, a comparison of these figures quickly shows that, as of the present time, aside from the federally operated long distance service, municipal ownership operation is the rule rather than the exception in Alaska.

This means that when President Eisenhower asks for enabling legislation to dispose of the ACS long distance facilities to "private enterprise" the greatly augmented public ownership bloc in the new 86th Congress may have some different ideas. They may insist on the municipalities and possibly cooperatives getting into Alaskan long distance telephone business via a "preference clause."

A "preference clause" is a very successful public ownership gimmick by which anything the federal government sells or disposes of must go first of all to municipal plants, public utility districts, cooperatives, etc. Only if none

of these exist, or are not interested, can the facilities be sold to private companies. Such would be the case if Congress were to slip a "preference clause" into the enabling legislation. Such "preference clause" provisions are now routine in some 30 or 40 federal power statutes, such as the Tennessee Valley Authority Act, and others.

The Eisenhower administration is certainly not likely to ask Congress to set up such a "preference clause" arrangement. But, the public ownership bloc in Congress is very likely to cast an appraising eye on Alaska as an opportunity for creating an entering wedge into an industry which hitherto (in the old 48-state United States, at least) has been more or less an exclusive reserve of private enterprise. Alaska must not become a hot house for public ownership in the telephone business.

REA Appropriations

Incidentally, the President's budget message also asked for more funds for REA in both rural electric and the rural telephone departments. The President renewed his request for an increase in interest rates charged on REA electric and telephone loans and legislation to facilitate private financing for future co-op expansion. He also requested that much future expansion be accomplished by means of a revolving fund.

The budget asks for 136 million dollars in new funds for REA electric loans, and 79 million dollars for telephone loans, plus a 25 million dollar contingency fund for each loan program. In addition, REA will have available carry-overs of 109 million dollars for the electric loan program and 1 million dollars for the telephone program.

With respect to the REA interest charge proposals, Rep. Ancher Nelsen (R., Minn.), former Rural Electrification Administrator, said, on Jan. 22, it may be necessary to consider changes in the REA interest rate "some time," but he will oppose any change at present. Under current law, interest rates on REA loans are fixed at no more than 2 per cent. President Eisenhower has said he will ask Congress to authorize a rate that would equal the interest the government pays when it borrows money.

Nelsen said he favors leaving the REA rate "right where it is" for the present. The former administration official reserved judgment—until he sees details—on the administration proposal to draw funds from private lenders into the REA lending program. Nelsen said he believed REA cooperatives would be better off if "some day" they could be free of the "political hazard" of depending on Congress for all loan funds. But in any change of this kind, he emphasized, interest rates "must be reasonable . . . and fair."

REA Approves Three Loans

The Rural Electrification Administration has approved the following three loans:

Lehigh Valley Cooperative Telephone Association, Lehigh, Ia.; $117,000; Jan. 12.

The borrower plans to use these funds to improve service for 200 existing subscribers and to furnish initial service to 20 rural families. The present subscribers are now receiving magneto service from the Harcourt Cooperative Telephone Co., which the borrower proposes to acquire and integrate.

A new automatic central office is scheduled to replace the existing magneto facilities in Harcourt. This borrower has now received REA loans totaling $309,000 which will enable it to furnish new and improved service to 725 rural subscribers. The Lehigh exchange is now furnishing dial service to about 475 rural subscribers.

G. E. Thomas is president and Audrey Q. Eslick is manager of the Lehigh Valley co-op.

•

The Thorntown (Ind.) Telephone Co.; $330,000; Jan. 16.

The new borrower plans to improve service for its 763 existing subscribers and to furnish initial service to 143 rural families in its area. The present common battery system will be converted to automatic operation, and a new automatic central-commercial office building will be constructed.

Owen E. Curry is president and manager of the Thorntown company.

•

Mason County Telephone Co., Maysville, Ky.; $1,108,000; Jan. 16.

This loan will enable the borrower to improve service for 1,437 subscribers and to furnish initial service to 1,007 rural families. The existing subscribers now receive common battery service from the Irvine-Ravenna Telephone Co., Irvine. The Mason company plans to acquire these facilities and to acquire eight miles of toll line from the Southern Bell Telephone & Telegraph Co.

A new combination automatic and commercial office building will be built at Irvine to serve the southern portion of the Mason County Telephone system.

REA loans to the Mason county company now total $1,834,000 and will benefit 3,506 subscribers. The completed system will consist of six exchanges of which five are now in operation serving approximately 1,000 subscribers.

LeRoy T. Carlson is president of the Mason County Telephone Co. and James H. Crawford is manager of the Estill County portion of the system.

Two Ways of Making Jobs

There is probably no essential relationship between a man driving to work in his own automobile and a man going out without a hat. True, a man who walks to work or rides a public conveyance is more likely to feel the need of a hat than the driver of a private car which is heated in the cold weather and probably overheated in the summer. But there is an interesting comparison to be drawn in the respective steps taken by two different labor unions in trying to stem the rising tide of deserting patronage from both the railroads and the hat stores.

Consider the passenger railroad business first, because that is a public utility industry. It is unlike the telephone, gas or electric utility business in that it has reached, in many areas, what the economists call a "point of diminishing returns." Rising operating costs have made passenger service so expensive that fares have reached the level where further increases simply drive more passengers away. The telephone, gas, and electric utilities are fortunate in still having an expanding business in which the value of the

(Please turn to page 40)

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THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

LAST YEAR, the Blain family decided to break with tradition and spend the Christmas holidays in other than the conventional manner. So, early on the morning of Dec. 7, we loaded the dogs into the Chrysler and headed south.

Our first stop was in Florida, at Indian Lake Estates, near Lake Wales. We purchased a lot in this new development two years ago with a view to some day utilizing it as our retirement home. This is a well-planned country club community on a 15-square-mile sand-bottom lake. An 18-hole golf course and a club house are being provided and an 1100-foot pier has been completed. All purchasers are automatically members of the country club.

At Indian Lake we visited R. L. Lunsford and his wife. Mr. Lunsford is a retired Bell Laboratories engineer who moved into a beautiful new home in this development last October. Should all telephone men seeking a retirement home in the sun consider Indian Lake Estates, this could develop into an interesting telephone colony.

Leaving Florida, we proceeded west through Mississippi, Alabama, Louisiana and into Texas where we visited the writer's brothers, Lake and Basil, in Yoakum. Here, we drove a Model "T" Ford. This was truly an experience as we had forgotten how difficult it was to steer those old wagons. Perhaps power steering has made us soft. We paused three days in New Orleans en route to see the sights and to take some interesting color slides.

Next we drove north to revisit some of the scenes of the writer's early telephone work in Oklahoma. These included Altus, Elk City, Clinton and El Reno, locations where "yours truly" once filled the office of plant chief over 40 years ago. Needless to state, some changes have been made.

We stopped briefly at Carter, Okla., where we began our telephone career back in January, 1913. This, our first job, was on a line gang installing a 10-pin crossarm and stringing a circuit of No. 9 iron wire on railroad poles. Strange as it may seem, this line is still in service although three additional circuits have been added. We do not know how many poles and crossarms have been replaced, but they did possess a most familiar appearance.

We next visited Weatherford, Okla., which was for many years our home. We pursued an easterly course stopping to view the oil wells on the capital grounds in Oklahoma City, and later going on to do some sightseeing at Fort Smith, Hot Springs and Little Rock, Ark. Then on to Memphis and Nashville, Tenn.

In Nashville, we enjoyed a visit to The Hermitage, home of Gen. Andrew Jackson, seventh President of the United States, and the American reproduction of the Parthenon of Pericles. We have seen the Parthenon in Athens, Greece, and must admit that its counterpart in Nashville is in a much better state of repair.

We drove northward through Bardstown, Ky., where we visited Lincoln's birthplace and "The Old Kentucky Home" where Stephen Collins Foster wrote the song by the same name. We did not have time to visit any of the numerous nearby distilleries, but they did emit a wonderful aroma. We spent one night in Lexington, Ky., and then headed east through the mountains of West Virginia and to our home in Virginia, arriving on New Year's Eve.

This trip, of nearly 6,000 miles, took us through a total of 14 states.

It was amazing to observe the number of farms that are still without telephone service in certain sections of the country. Some prosperous farms have good buildings, electric power and TV, but do not have telephones. Other farm homes, not so prosperous in appearance, likewise have electric power, TV and a good car parked in the driveway, but no telephone. This might indicate that the telephone people have not done as good a selling job as the power people, TV and automobile salesmen.

It is possible, too, that in some communities rural telephone service is of such an inferior quality that it is practically worthless. Much to our surprise, we observed many grounded rural lines still in service. Some of these parallel power lines for long distances and how they can expect service under these conditions is a mystery. The insulators, often missing, were in most cases a No. 4 porcelain knob held in place by a nail and a leather washer. We understand that in some localities the term "grounded line" is taboo. The term "semi-metallic line" is preferred. Personally, we doubt that under any name a grounded line will provide a satisfactory grade of service in this day and age.

We do not intend to imply that all rural line construction observed was inferior. In many localities, cable provides rural service which is undoubtedly comparable to that provided in metropolitan areas. We were amazed at the amount of small plastic and rural distribution cables that are being used in many sections of the country. Load coils are also used extensively. Many open wire leads are loaded with subscribers' carrier. There is little doubt that this service could be increased to advantage in many areas.

Buried wire and cable are also extensively used in many sections of the country. Long spans and small cables appear to provide good and economical rural telephone service in all areas.

We noted numerous microwave towers in every state we visited. It is obvious that the present-day trend is to use microwave for long distances and cable for short-haul circuits.

During our entire trip we observed only two open wire jobs, which apparently had been constructed during the past year. In two locations we observed

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Public Enterprise and Public Affairs

By FREDERICK R. KAPPEL*

WHEN Mr. Cook invited me to speak to you, I warned him you might have to listen to some telephone shop talk. He said that would be all right but he hoped that I wouldn't take all the time for that purpose. I'll certainly try to keep his word of caution in mind. Nevertheless I think I can get on my way best by starting with a few words about the Bell System and then moving along from there.

I am glad to report, naturally, that our business is on the way up. A year ago at this time our rate of growth was falling off, and last Winter and Spring we were adding telephones at a rate about 40 per cent below 1957. Then things began to improve during the summer, and since August we have been running ahead of a year ago. Taking 1958 as a whole, we shall probably gain close to 2½ million telephones, compared with 2.8 million in 1957. Long distance conversations this year will run about 5 per cent ahead of last.

In 1959 we hope and expect to increase these figures considerably. We doubt that our (1959) growth will break any records. However, we do look for a real rise in the public's wants for communication service and we are well prepared to handle this. For the fourth consecutive year, our construction expenditures to enlarge and modernize telephone facilities will exceed 2 billion dollars.

Build Plant Margins

I said we are well prepared. One reason for this is that we did not cut our 1958 construction program to the bone when our rate of growth, as I mentioned, began to slip off. We made some reduction, yes, in the amount budgeted to take care of future expansion. I think prudent judgment required this. However, we did feel sure that renewed growth *was* coming a bit later on. So instead of cutting down drastically — which would only mean having to race the motor later in order to catch up—we went ahead with our financing and proceeded to build quite a lot of useful margin into our plant. Moreover, we kept virtually unchanged that portion of our total expenditures which was budgeted for modernizing our plant—I mean, for installing new dial systems and other equipment which makes telephone service more efficient and also more attractive to our customers.

Let me make a little comment here. I don't think we could have gone ahead with our 1958 construction as we did, if we had not been able in the last few years to improve our earnings and strengthen our financial position. I've said this before, but I want to repeat it now because I hope the point will not go unnoticed. The plain fact is, we could do what was right for the long-run because we were better able to afford it. And, I'd like to point out, too, that in the process, we have been able to keep telephone employment at a higher level than would have been possible otherwise.

So often, people who are interested mainly in the labor side of the business picture will argue that improvement in profit is made at labor's expense. But the point here is that our somewhat better financial situation—which made it possible to carry on a better than 2-billion-dollar construction program notwithstanding the recession—has been much to the benefit of employes as well as to the rest of the community.

I don't mean we have been running a "make-work" program. We have not. We need everything we have built. However, our ability to continue building in orderly fashion, at a time when our rate of growth was going down, has kept a great many people usefully at work. So you see—and I believe labor leaders and our representatives in government will also see—that profit serves the public good in more ways than one.

Must Be Financially Strong

This leads me into stating briefly what I think are some of the most important factors bearing on the economic health of the country and the welfare of everybody in it.

The first is that any business must have the freedom to make itself financially strong if its products and services meet the test of competition in the market.

The second is that we must not and cannot let up in our efforts to bring about *real* gains in productivity. (I say "real gains" for a reason I'll explain in a moment.) In the years ahead we shall have a rising population, more young people and older people, and a relatively smaller working force. So if we fail to be more productive our standards of living will surely go down.

This means, in my judgment, that industry has a very real need to increase its research and development work, including basic research. We need to invent, develop, and design new and more efficient products and services. We need better plants, methods, and systems to produce them. Incidentally, I might mention that in 1959, at Bell Telephone Laboratories, we expect to be carrying on the largest research and development program we have ever undertaken.

Now, let me explain why I spoke of "real gains" in productivity. I did so because it seems to me there is a tendency nowadays to rack up estimates of increased productivity without counting in all the costs of production. The costs that get left out are the added capital costs as investment increases. To my mind, all the charts, graphs, estimates, and forecasts that leave these out are just so many statistical fantasies.

This bears directly on my third point —namely, that the continuous hiking of wages beyond real gains in productivity is sure to intensify inflation. As industry makes such gains, everyone ought to share the benefits. However, if wage increases absorb them all, and more besides, not only is sharing im-

*Mr. Kappel is President of American Telephone & Telegraph Co. He gave this address at the November, 1958, meeting of The Bond Club of New York.

possible—we are living beyond our means and in the long-run no one will benefit. In my judgment, also, the practice of guaranteeing additional wages in future years tends to increase the danger even further.

Too Many Restrictions

Fourth on my list, we have this tremendous pressure for government spending; and at the same time, a disposition on the part of many people in government to put more and more restrictions on business. There may be better ways than this to commit fiscal suicide, but if there are I haven't heard about them. Added restrictions only make it harder for business to do what it ought to be doing—that is—take more risks, sell more goods, and produce the earnings without which the tax collector can never find the money to pay the government's bills.

As I read the news, the impulse to drift or drive—whatever you want to call it—toward more government spending now seems stronger than ever. This disturbs me not a little, and I notice it also disturbs quite a few members of Congress itself. In these circumstances, the eventual danger seems to me to lie in the establishment of wage-price controls. I think such controls in peace time would mean the end, at least to a large extent, of what we call our free enterprise system. And I believe we must find a way to bring the American people face to face with the question—is this what they want?

As I remember, it was Mark Twain who said that everybody talked about the weather but nobody ever did anything about it. Nowadays, everybody talks about inflation, but few of the efforts to do something about it have had conspicuous success. Ideally, if inequities in taxation were eliminated or minimized, the over-all tax burden on business reduced, and individual incentives restored, I think gains in productivity would accelerate, we would have much less inflation of prices, real wages would increase, business would do more business, and government revenues would be greater.

Must Express Ourselves

Maybe not every economist would agree with that statement, but I know some who do, because I asked them to read it before I said it and they gave me a green light. Moreover, my observation is that government is just full of able, hard-working and reasonable men who have much the same fundamental thoughts. As a practical matter, however, circumstances press them hard. They must read the wishes and attitudes of their constituents — which they are in no position to ignore. It is difficult for them to act always as they would most deeply and personally desire. And, I think we in business have added to their difficulties by failing to expose ourselves, our ideas, and the facts at our command in ways that win widespread belief.

All of us hear more and more these days that business should throw off past restraints and "get into politics"—to put that phrase in quotes. It is a phrase that can be interpreted in different ways. One interpretation—and a good one—is that businessmen as individuals ought to be more active in public and political affairs. I'll say a word about that in a moment. First, however, let me comment briefly on another interpretation which sems to me dangerous. This is that with labor already in there pitching to get candidates nominated and elected, business—as such—had better get going and do the same.

I think this idea can do great harm. In the long-run, I think it would fail even if it were to have some immediate success. The reason it would fail is that any time the people of this country decide that their elected representatives have been maneuvered into office by a particular group—be it organized business or organized labor—they will, and they should, vote them out. It may take a little time, but it will happen.

Service Comes First

What then should we in business be doing about these things? How can we bring about better relations between ourselves and our representatives in government? What is our proper responsibility in public affairs? How shall we increase public understanding of the problems of industry, and confidence in our determination and ability to serve the public interest? Again I shall mention four points.

Number one in our business—and I would assume in any business—is that we simply must do the best possible job for the people we serve. I know that sounds obvious and I am sorry if you think I am being trite. But we can never, never forget this. In my humble opinion, it must always be the first thought in our minds.

The second point I tried to express when I was talking to a group of telephone people a couple of months ago. I said it this way:

Doing our best is not enough. We must also tell our story and tell it convincingly. We must do this in every community. We must see to it that the public really knows us, and that the public's representatives in government are directly and fully and honestly informed about what we are trying to do. If we are given treatment that we believe is wrong or short-sighted, we must say so and say why—and never stop working to get the situation corrected. When, on the other hand, regulators and legislators give us the means and encouragement to step up progress, then we must work to the limit to justify their confidence.

Excise Taxes Must Go

Just in passing, as an example of a situation that needs correcting I might mention the federal excise tax on telephone service, which is paid directly by telephone users. This began as an emergency measure and is one of the most discriminatory of all taxes. In fact, the telephone is the only household utility that is so taxed. We realize well enough that now may not be the right time to reduce taxes. But, the fact is that proposals have now been made, which if given legislative sanction, would embed telephone excise taxes *permanently* in *both* the federal and state tax structures. This would perpetuate discrimination and we shall oppose it by every proper means. I hope you will too.

However, I should also like to add—let us once and for all get over the habit of going to people in government when we need something, and ignoring them when we have nothing to ask for. Let's never ignore them—and I mean never. Let us rather, as their constituents, invite them on all suitable occasions to tell us what they have been doing. Let us invite them also to see what we have been doing. Let us tell them our plans, and take a sincere interest in theirs. Let us, by all means, increase our understanding of their problems, as we hope they will gain insight into ours.

To do this will not of itself settle anything. Nor do I think it should. But, if we in business are the kind of people we ought to be, then it ought to be good for people in government to know us as we are. In addition, it ought to foster more interest in government on the part of more people in business.

Politics For Individuals

This last is really my third point. You remember I said a few minutes ago that I thought business should be very wary of taking the same kind of leaps into politics that labor is taking. But, I certainly did not mean that businessmen as citizens should lie down and play dead. On the contrary, business and especially big business has been criticized, and it seems to me with justice, for making it difficult for people in management to take part in public affairs. The net result, says the criticism, is that far too many of us—man-

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agers and employes alike—are politically inert: We have little or no idea of what democratic government is all about or of what the duties of citizenship are.

I am not talking about running for office and holding down a management job at the same time. Though there may be exceptional cases, generally the two do not mix. I think it might be difficult, for example, to be the mayor of a city and at the same time manager of the local telephone exchange. On the other hand, there will be situations where there is no possible conflict of interest, and one person can handle two jobs well. Circumstances alter cases. And, quite apart from office-holding, I see every reason for encouraging people in business to engage in political affairs, as individual citizens, and no possible reason for discouraging it.

Now I'll come to my fourth and last point. Recently, in an article on foreign affairs, I read this thought—that today, 80 per cent of the population of the world is having a brand new experience. For the first time in history, they are waking up to the fact that the price of rice is related to the kind of government they have.

Rice and Government

I wonder how many men and women in American industry really understand *how* the price of rice is related to the kind of government *they* have and the kind of government they vote for. Or to say what I mean in less figurative language—do they know that how well their industry can serve *their* interest depends on how well it can serve the interest of *all?*

Do they know that this depends, in turn, on the freedom their industry is given to prosper?

Do they know that a healthy *economic* climate depends on the *political* climate their votes establish?

As to any political plan or program, regardless of who proposes it, do they search out the answers to questions like these:

Will it benefit the whole community—or just some people at the expense of others?

Is it good for the long-run—or will it pile up trouble later on?

Is it sincere—or just smart politics?

I do not at all underestimate the intelligence of people in industry. I think they are well able to look at the evidence and decide.

But, I think they have not always had all the evidence. In fact, sometimes the evidence about boils down to each party trying to promise more than the other. And, while I am dead against

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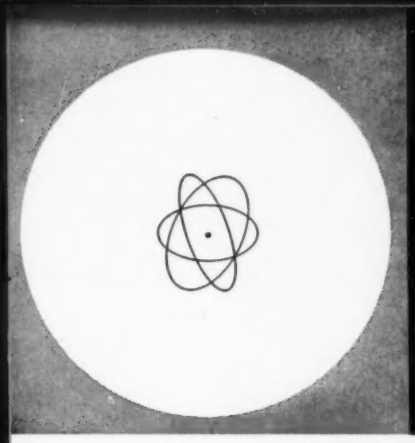


TELEPHONY'S ELECTRONICS SECTION

BY HAROLD B. McKAY, ELECTRONICS EDITOR

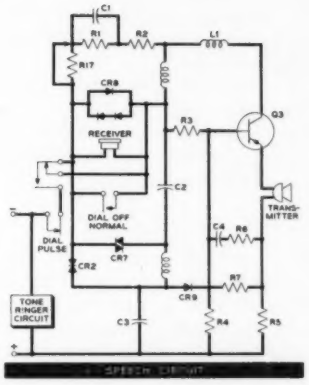
ELECTRONIC HANDSET

THE TRANSISTOR has been applied to various parts of the regular telephone set. It has been used to amplify received voices for the hard of hearing. It has been used as a tone generator with a small loudspeaker to take the place of the telephone bell. The transistor has also been used to amplify outgoing speech.

The development of electronic switching has imposed some new requirements on telephone sets. Electronic equipment is being designed to operate at low power levels. The relatively heavy direct currents used for talking and switching will be a thing of the past once electronic switching is used. Also, the 20-cycle, 90-or-more volt ringer requirements are not practical in an electronic system.

The transistor is rapidly becoming one of the most dynamic forces in the design of modern communications systems, according to the *Bell Laboratories Record*. In addition to changing switching concepts, it is changing the telephone instrument itself. The latest development is a completely new, transistorized telephone, which will be used in the field trials of the electronic switching system. The new set has been designed to equal or better the performance of the 500 type set.

The new instrument uses an average of one-half watt of central office power during talking. The older sets use about three watts. Current range of an ordinary telephone, depending on loop length, is from 25 to 190 milliamperes. The new set uses only 8.5 to 13 milliamperes. Instead of 90 volts for ringing, the transistorized set needs only two volts.



The speech circuit for the electronic telephone contains a transistor amplifier, anti-sidetone circuit, click-suppression feature, lightning protection and equalization for different lengths of loop. (Drawing courtesy of Bell Laboratories Record).

The ringer is actually a transistorized sound generator. The signal from the office excites a frequency selective circuit which drives a transistor amplifier. This amplifier produces an audible tone in a small loudspeaker.

The speech circuit of the new telephone is shown in the accompanying drawing. The output of the small transmitter is low, so it is amplified by a transistor, Q3. Other features of the new instrument include anti-sidetone circuit, click reduction in the receiver, automatic adjustment in the set of transmit and receive levels (occasioned by different loop lengths) and even a lightning arrestor type of circuit which will protect the transistor from voltage surges.

The instrument will use a conventional dial, and direct current pulses for calling a number. However, the electronic switching center will respond faster than a mechanical exchange, so the dial will be made to run twice as fast.

COMMUNICATION LAGS

THE SECOND Annual Symposium on Global Communications was held last month in St. Petersburg, Fla. A few things were discussed that suggest an even greater influence of electronics on the telephone companies in the future.

One stumbling block in communications right now is data transmission. This is not working out too well in different communication systems. New developments in this field are needed, it was said.

Much of the radio spectrum is now used up by interference, according to remarks by Donald Fink, president of Institute of Radio Engineers. Some radio systems now work on a point-to-point basis, that is, their transmissions are intended to be received by only one other station. Yet, these transmissions are "broadcast" in a manner which clutters up the spectrum. This is because highly directional antennas are difficult to make at the frequencies required for long distance operation.

He forecast the increased use of microwave and scatter systems for point-to-point transmissions. He also declared that the use of transistors will make transmission by cable more reliable. More cable must be used for point-to-point service in order to free the radio spectrum for other services.

The success of the Atlantic telephone cable has resulted in the planning of new cables by British and American interests.

However, a startling deficiency in communications was pointed out by military people who spoke at the meeting. The armed services, it was said, need three important things—transportation, firepower and communication. Since World War II, transportation has improved from planes that traveled 300 mph to ones that hit up to three or four times the speed of sound. Firepower has improved from the TNT to the H-bomb level.

But, communication is just about where it was at the end of the war. Weakest points, the military men said, were in manual and semi-automatic switching systems. Manual message progress can bog down an automatic system. For instance it does no good to send a high speed teletypewritten message around the world, if you can't get it delivered at its destination.

KLYSTRONS AND JAM

TWENTY years ago a pilot for Pan-American named Sigurd Varian was concerned about the possibility of bombing through overcast skies. He wondered about our vulnerability from attack by aircraft which could not even be seen. With Russell Varian and with the help of a $100 grant from Stanford University, they set about finding a means for detecting invisible aircraft.

Their 23rd experiment produced a suitable source of centimeter waves and they named it the Klystron after a Greek word describing waves breaking on a beach.

Many of the famous electronic firms in the San Francisco Bay Area started their business by making things far removed from their products today. One large instrument maker started in making machines to cook hotdogs. Varian Associates was no exception. When the company first opened for business in San Carlos, Cal., some of the associates found it necessary to carry on some of their housekeeping chores in the rear of the building.

Someone contributed a crop of blackberries that was growing on his property, so the first operation to be carried on was the making of blackberry jam.

According to the *"Grid"* an air force inspector marched in while this operation was underway and wondered whether he was in a Klystron facility or a jam factory.

VTVM

A VACUUM tube voltmeter is usually thought of as a portable instrument with a high input impedance. Its principal advantage is that it can measure the voltage in a circuit without putting a load upon that

The Metronix minified electronic voltmeter is self-contained in the 6-inch meter case.

circuit. Thus, it can measure voltage accurately in a circuit without having the meter upset the circuit operation.

There are some applications, however, where a portable instrument is not required. To meet this need Metronix Inc. of Chesterland, O., now manufactures a minified panel mounted electronic voltmeter, available in either ac or dc models. The instruments have a scale arc of 5⅛ inches in a 6-inch meter case.

The dc model reads from 1 to 1000 volts with an input resistance of 10 megohms. The ac model with frequency response of from 20 cycles per second to 100 kilocycles offers 10 ranges from 10 millivolts to 300 volts rms. Input impedance is one megohm, which would appear to qualify it for telephone carrier frequency measurements.

ELECTRONIC COUNTER

TELEPHONE offices have long used manual and electric counting devices for peg counts, all-trunks-busy tallies and other traffic conditions. When

A combined electric and magnetic counter which will handle 12,000 counts per minute.

common control dialing came into use, faster magnetic counting devices were needed to keep up with the call-handling capacities of devices like decoders.

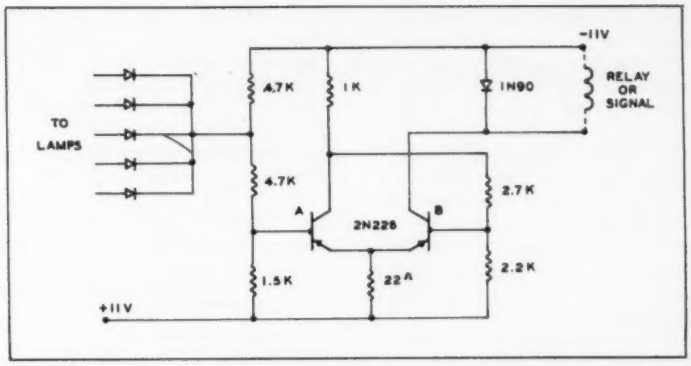
The next step from a mechanical counter is an electronic counter. This kind of a counter, which uses transistors and tubes can count millions of impulses per second.

Now, at last, somebody has come to the rescue of the man who needs a fast counter, but doesn't want to pay the cost of going off into the millions. The new device is a combined electronic and magnetic counter. The

digit register of the machine is an electronic decade, with lamps which show the digits 0 to 9. This combines with a five-digit mechanical register which tallies the rest of the decimal places.

As a result, counting speeds of 12,000 per minute can be obtained. Counting pulses can be from photoelectric cells, magnetic pickups, or contact closures. Input signals can be sinusodial, rectangular or slow-rising.

The new instrument is made by Performance Measurements Co., 15301 W. MacNichols, Detroit 35, Mich.



An electronic switch, using transistors, which operates the night alarm bell in a central office. (Drawing by Victor Willard).

DON'T KICK THE BOARD

TELEPHONE men who have had experience with manual switchboards remember a familiar case of trouble caused by the auxiliary or night alarm relay becoming stuck. This relay was of low resistance, and the common battery supply for all of the lamps in a switchboard panel or position went through the winding. The relay had to be adjusted so that the current drawn by only one lamp would be enough to operate the relay and ring the night alarm bell.

When the relay was adjusted to be sensitive enough to do this, it would often stick and remain operated if several lamps lighted up at once. The classical remedy for this was to "kick the board" and jar the relay loose.

Now a transistor circuit has been developed that will always deliver the same amount of current to a relay or bell, no matter how many lamps come in. The circuit is an electronic switch. In the accompanying drawing, the transistors 2N226 are hooked up in what is called multivibrator, or electronic switch. When the circuit is at rest, and no lamps are lighted, a negative condition appears on the lamp leads.

The current flow through the 4.7 K resistor and the 1.5 K resistor results in a negative voltage of about one volt on the base of the left hand transistor, A. This keeps transistor A in a conducting condition, that is, current flows from the base to the collector circuit. This current flow creates a voltage drop in the 1 K collector resistor of transistor A, which results in a potential of about .2 volt being applied to the base of the right hand transistor B.

Transistor B under these conditions is non-conducting.

When a lamp in the associated circuit is lighted, the lamp lead becomes less negative, or more positive, depending on the point of view. This changes the voltage on the base of transistor A from —1 volt to about —.1 volt. Transistor A then stops conducting. This lets the voltage on the base of transistor B rise to a point where B will conduct.

This action is that of a trigger circuit, or flip-flop. This pair of transistors acts like a two-way switch. Electrically, it must be in one of two states; either one or the other transistor will be conducting, and the other will be non-conducting. In this application, there is no variable amplification expected from the transistors; they are either turned "on" or "off." The flip-flop circuit is widely used in electronic applications of different sorts.

When transistor B conducts, as described above, the power output from it can be used to operate a regular central office alarm relay, or can be connected directly to a bell or lamp signal.

The 1N90 diode connected across the relay winding is a kick-back preventer, which shorts out any voltage surge from the relay winding which might result when the circuit returns to normal. The diodes in the lamp leads are for isolation purposes; that is, voltage sent into this circuit over one lamp lead cannot detour and go back to the other lamps on the other leads.

This circuit was developed by Moore Associates of Redwood City, Cal. for the Hawaiian Telephone Co., in connection with a Monitron installation on a telephone radio station.

CONVERTERS

MAN, it seems, is never satisfied. When he has dc, he wants ac, and when he has ac, he wants dc. As a result, the electronic business is full of rectifiers, dynamotors, motor-gen-

erators, converters and inverters. However, the advent of the transistor is making changes in the old concept of rotary machinery to change one kind of current to another.

Some auto radios now come equipped with a pair of transistors in an oscillatory circuit which changes dc to ac so that it can be stepped up in voltage by means of a transformer. However, the applications now go further than this. Transistorized converter-inverters can now be obtained to furnish a wide range of voltages and frequencies for power supplies on everything from radar sets to rural radio-telephones.

You can get a bulletin describing a new "Transidyne Converter-Inverter" by writing to Spectrol Electronics Corp., San Gabriel, Cal.

VOLTAGE REGULATOR

ELECTRONIC equipment of different sorts frequently requires that its voltage supply be regulated within close limits. Radio sets and other units using vacuum tubes often contain special voltage regulating circuits to keep plate voltage within certain limits, in spite of line voltage changes, or variable loads within the apparatus itself. This has usually been necessary to keep the equipment operating at the proper frequency or within other requirements.

The voltage regulators used in such equipment were often designed around "VR" tubes. These are gas filled tubes which can be connected in a direct current power supply in a manner which will draw more or less current as the voltage varies, and thus stabilize the power. These tubes are available for different ranges from 75 volts up.

Transistorized electronic equipment requires voltage regulation also. In addition, to correct functioning of equipment, attention must sometimes be paid to the burn-out point of transistors. While a tube can take a temporary overload without serious damage, some transistors will pop like a fuse if the safe voltage limit is exceeded.

Voltage regulation equipment for transistor circuits can be quite different from that used in vacuum tube circuits. Instead of 75 volts or more, regulated voltages of 3 or 4 volts may be needed. The answer to this has been to use additional transistors or other semi-conductors for voltage regulation.

The Bell Laboratories Record describes a system which uses a silicon diode for the voltage reference, and a transistor to regulate the output of a power supply. A basic principle in regulators of all sorts is that of error detection. Thus, a thermostat on a furnace operates by detecting the error between the temperature you want and the temperature you have.

The transistor voltage regulator works the same way. A silicon diode, some types of which will respond on voltages as low as 3.5, is used to detect variations of the output voltage of the power supply. A transistor amplifier is used to couple the diode to another transistor which is in series with the output current of the power supply. If the output varies, the error detector will produce a current signal which is proportional to the change of output voltage.

This current is amplified and applied to the base of the transistor which is in series with the load. The base current determines the collector current of this transistor, or its collector-to-emitter voltage. Because this voltage is in series with the output, it keeps the output voltage steady.

TALKING BUSES

THE Rochester (N. Y.) Transit Corp. became the first urban transit system in the country to go all out for electronics. The company's entire fleet of 300 buses has been equipped with two-way radios. Stromberg-Carlson built the equipment.

COMMUNICATION PROBLEMS

MAN has always had difficulty communicating with his fellows, and imparting his ideas to others. Certain barriers exist outside of science, and new barriers develop within science itself. International Business Machines is interested in breaking down these barriers by means of its machines. The October, 1958 issue of the *IBM Journal of Research & Development* contains an interesting analysis of the barriers to scientific communication.

Outside of science, some of the barriers which exist include distance, nationalism, secrecy and censorship, prejudice, ignorance, and the Tower of Babel of language. Within science there are the barriers of specialization and scientific literature.

Specialization has its advantages, but it impedes the cross-fertilization of one scientific domain by another, and in effect creates a confusion of tongues within the same tongue. This is unfortunate because the most important advances in science have always come from the boundary areas between different sciences. An example cited is that of the great Pasteur, who did much for medical science, although he was not a medical man.

The problem of scientific literature is something that IBM is working on. The vast bulk of scientific literature is causing our present system to collapse of its own weight. New means of publication, retrieval, selection and use of scientific information are needed. At one time the letters or private papers of scientists held the world's scientific knowledge. Now, the published documents run into the tens of millions.

Speed of transportation has greatly contributed to breaking down the barriers outside of science, and has led to greater cooperation between men in different parts of the world. The barriers within science are going to require an improved handling of scientific literature. Perhaps scientific papers in one field will have to be rewritten so that they can be understood by specialists in another field.

To search the huge bulk of literature will require the help of a machine of some sort, a "memory" to which quick access can be obtained. IBM and others are seeking the answer in a computer or such which will dig out the facts on a subject without shuffling a million sheets of paper.

3000 WPM

A TELETYPEWRITER capable of writing 3,000 words per minute, a line at a time, has been developed by the Army. The system, which is all-electronic, has a theoretical speed of 500,000 words per minute. The new machine does not have keys or type bars. Instead, each letter is made up of a combination of dots. The dots are made by a "printing" head composed of a bundle of tiny wires. These wires do not touch the paper, but produce an electrical image in the pattern of a letter, when the correct wires are energized. This electrostatic image can be made visible by applying powdered ink. The image can be fixed by the use of heat.

The new system is said to be low in cost, and virtually noiseless in operation. No clacking of type is heard—the only noise is that of the advancing of the paper.

THE STORASCOPE

A NEW cathode-ray tube has been developed by the Industrial Products Division of IT&T, called the Storascope. This tube has a special screen phosphor which will record and retain a picture for several days. It is designed to record transient pulses or signals recurring regularly or irregularly at frequencies up to 10 kilocycles.

Although the picture will remain visible for days, it may be erased in 20 seconds. The screen is then immediately ready for new recordings after the erasure. Through the use of a line-switching arrangement, the screen will record either enlarged single traces or ten traces in succession on ten separate lines.

how to get
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(without sending them to school)

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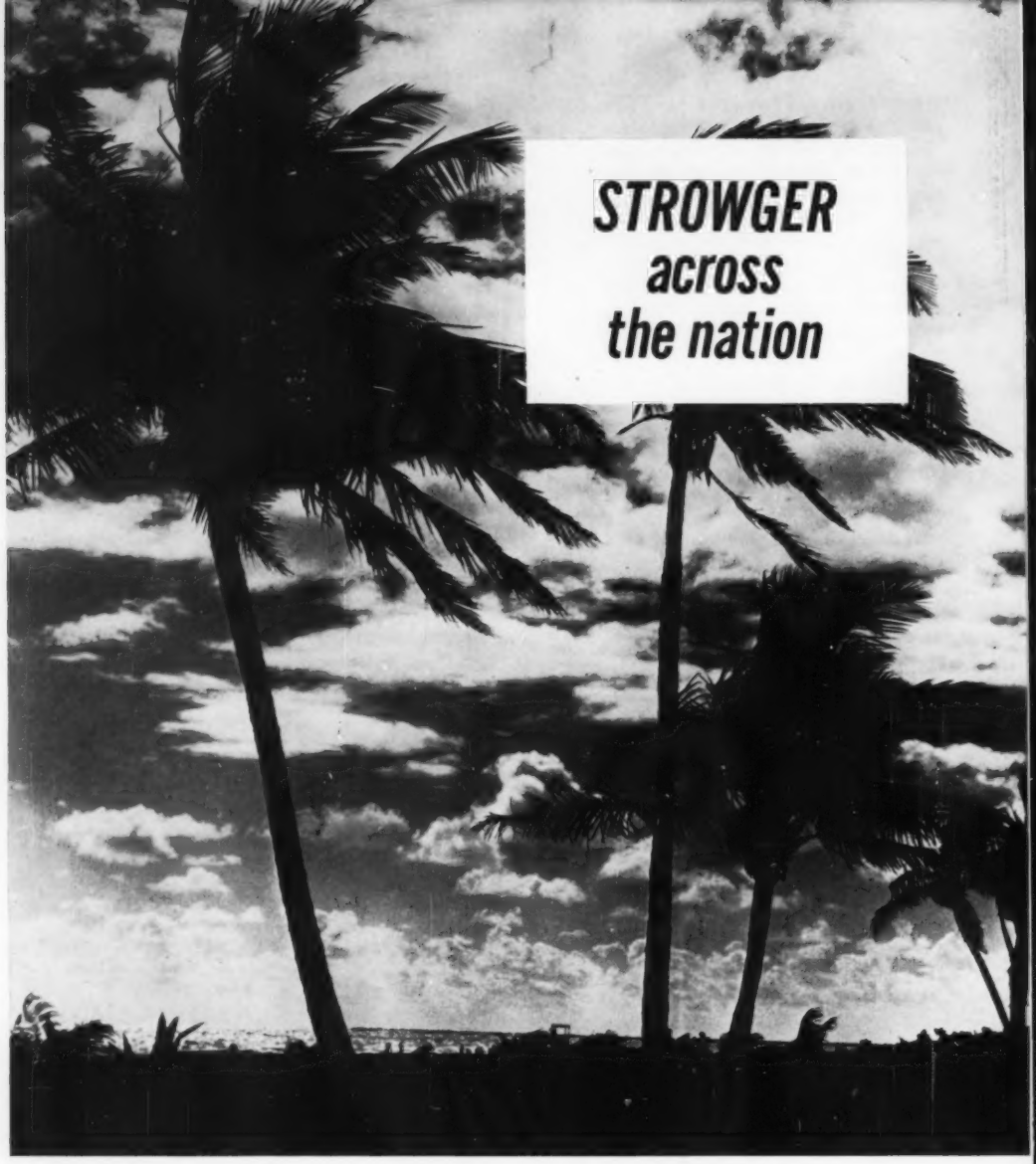


SWAYING PALMS, balmy weather and white sand beaches draw vacationers back to Naples each year. In 1950, Greater Naples had 1,450 permanent residents. Today, the resident population totals about 10,000. This figure is nearly doubled during the busy tourist season.

NAPLES, FLORIDA

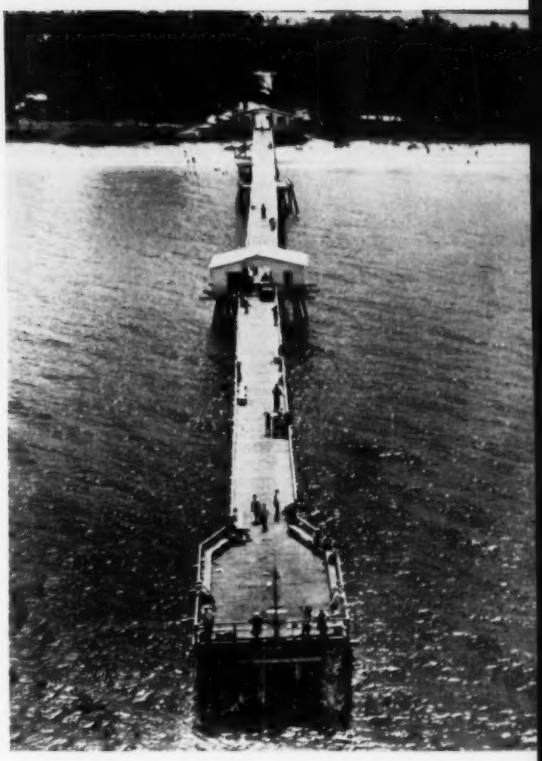
Despite sudden growth from a tiny fishing village to a major resort, proud residents vow that Naples will retain its quiet charm

At the edge of the Everglades, along the Tamiami Trail, lies the resort city of Naples, Florida. For many years, this secluded community was an irresistible lure to tourists and those seeking a place of retirement. Then, the nation's building boom reached Naples. Almost overnight, hotels, apartments and commercial buildings rose beside palm trees and glistening sand.

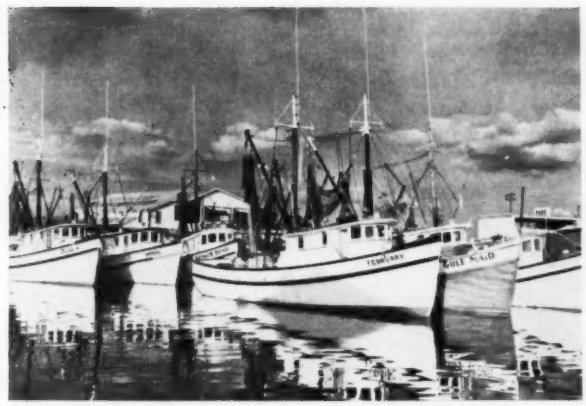
Today, Naples is a picturesque contrast of tropical beauty and modern architecture. But its rapid growth has been orderly. Far-sighted planning has retained the quiet residential charm of Naples. There are no race tracks, no commercial attractions, few night clubs. Rigid zoning and building codes are strictly enforced.

Naples is served by Inter-County Telephone and Telegraph Company. Each day—Automatic Electric stepping switches work behind the scenes to give dependable, low-cost telephone service. Yes, Naples is another success story of STROWGER ACROSS THE NATION.

INTER-COUNTY TELEPHONE & TELEGRAPH COMPANY recently erected this modern building to house the Naples business office and exchange. In January, 1958, five years after converting to dial, Inter-County chose Strowger Automatic to replace 1,200 lines and provide an additional 850 lines. This gives Naples a total of 2,050 lines with dial service connecting about 5,000 stations.



FREE FISHING PIER extends over 1,000 feet into the Gulf of Mexico. Catches off the pier include red fish, weak fish, sheepshead and many others. The pier is municipally owned and visitors are welcome to try their luck any time. It is claimed to be the longest pier of its type anywhere.



SHRIMP BOATS A'COMING! Shrimp boats line up at the dock to wait their turn for unloading. Until recent years, Naples was a small fishing village, with the shrimp fleet playing the major part in its economy.

J. N. JOHNSON (left), president, Inter-County Telephone & Telegraph, welcomes guests to the cutover celebration on January 15, 1958. Two of the first visitors were Arnold Pearson (center), A.E. staff engineer; and Grogan Shelor, A.E. salesman.

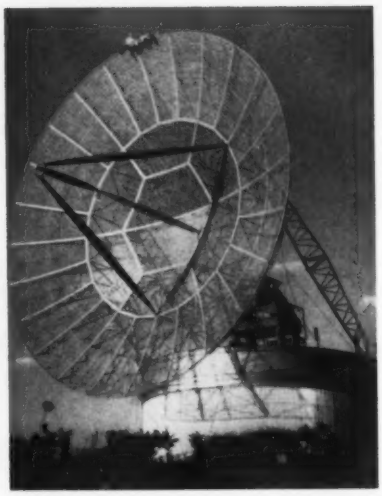
AUTOMATIC ELECTRIC

NORTHLAKE, ILLINOIS

Subsidiary of GENERAL TELEPHONE

Microwave Techniques

By HAROLD B. McKAY



All microwave antennas are not as small as the "saucers" seen on the tops of telephone buildings. The size of this monster can be judged by the men sitting on top of it. (Photo courtesy of Satellite-Kennedy Co.).

Part 2

AT FREQUENCIES above 500 megacycles conventional vacuum tubes are no longer efficient, largely because of their inter-electrode capacitances and also because of the transit time of the electrons within the tube. As a result, a number of special tubes have been developed for microwave frequencies, among them the magnetron, the backward wave oscillator, the traveling wave tube, and the klystron.

The klystron tube is widely used in telephone microwave applications. It is unique in that it avoids the troubles that earlier tubes encountered in high frequency application. For instance, the inter-electrode capacitance is of no significance because it lies outside of the radio frequency operating portion of the tube. The transit time of the electrons is actually taken advantage of in the operating principle of the tube.

Fig. 2.1 shows the essential parts of a klystron tube. A heated cathode emits electrons like any other tube. These are attracted by an anode which, unlike the plate of a regular vacuum tube, is a disc with a hole in it. The electrons pass through the hole and enter the input cavity. This cavity contains an electric field which has been built up as a result of the injected input signal. This field is alternating in step with the input.

As the electrons pass the gap G1 in the input cavity, they are either speeded up or slowed down depending on the polarity of the field in the input cavity at the time. Therefore, as the electrons travel in the "drift tube" between G1 and G2 they tend to bunch together because some are traveling fast and some are traveling slow. The cavities in a klystron tube are tuned to the operating frequency. Therefore, when the bunched electrons pass the gap G2 in the output cavity, they excite oscillation there just as pulses of plate current would excite a coil-condenser combination in a regular vacuum tube.

The power developed in the output cavity is greater than that which is put into the input cavity, so this amounts to amplification. Oscillation can be obtained by coupling part of the output back into the input as with any vacuum tube. The electrons which do not give up their energy to the output cavity are caught by the collector C.

Klystron tubes are made in a wide variety of sizes and designs, ranging from small receiving types to huge units several feet high. Some have additional cavities for better bunching of the electrons, and some have focusing magnets which keep the electrons centered into a small stream.

The reflex klystron is a type which uses only a single cavity. Its power output is very low, and it is widely used as a local oscillator in microwave receiving systems. It is also used as a transmitting oscillator in systems which radiate a watt or less of power. This includes telephone microwave systems.

The reflex klystron is shown in *Fig. 2.5*. A cathode releases electrons, which are attracted to the cavity grids. These grids are positive with respect to the cathode. The electrons pass through the cavity, but are turned back by the repeller plate, which has a negative charge. Oscillations occur in the cavity, and a high-frequency voltage will appear across the two cavity grids. This voltage will either accelerate or decelerate the electrons passing through

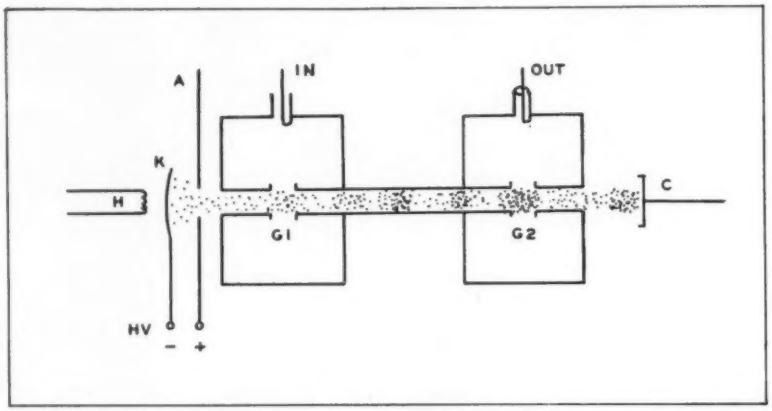


Fig. 2.1. In a klystron tube, electrons emitted by the cathode K are attracted by the anode A and are sent along the tube through the two cavities. The r.f. coming in to the first cavity either speeds up or retards the electrons, depending on polarity, at the gap G1. This results in the electrons being bunched. They deliver amplified energy to the output cavity as they pass gap G2. Collector C gathers up electrons which are not used in the cavity.

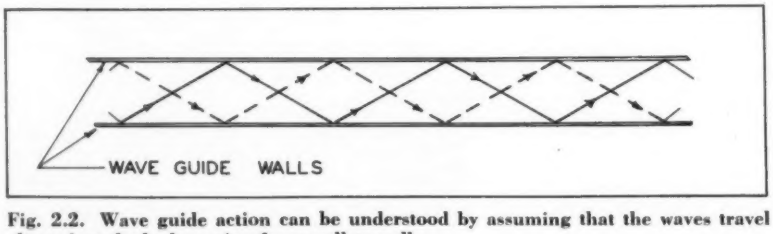


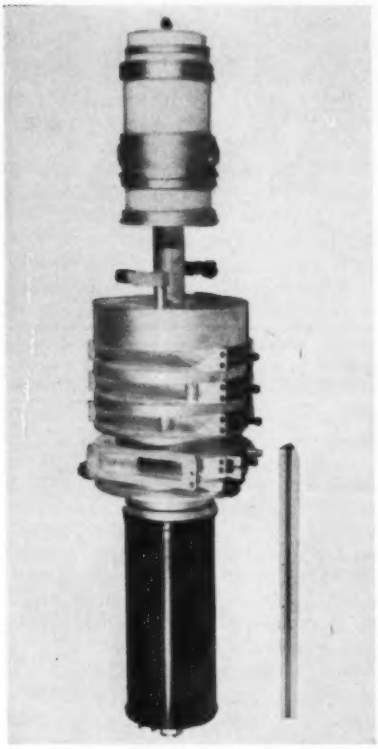
Fig. 2.2. Wave guide action can be understood by assuming that the waves travel along the tube by bouncing from wall to wall.

the grids, depending on the polarity at the time.

The result is that the electrons are bunched, as in the multi-cavity klystron. The electrons passing through the cavity ordinarily are reflected back at some point short of the repeller plate. Different electrons will travel different distances according to their velocity.

Wave Guides

Electric power of any sort must be carried along some sort of a line in order to get it from the place where it is generated to the place where it is used. This transmission of power involves certain losses. There is loss due to the resistance of the conductor being used, dielectric losses in the isulation material between or around the conductors and losses caused by radiation from the line.



This type of klystron tube is used as a power amplifier. (Eimac photo).

At microwave frequencies, these conditions become aggravated. High frequency currents are subject to the "skin effect," whereby they travel only on the surface of a conductor. This is equivalent to increasing the resistance of the line because only the "skin" of it is used. The insulation on a line increases its condenser effect and hence shunts down high frequencies more than it does lower frequencies.

To keep a transmission line from radiating its power like a radio antenna, it is necessary that both conductors be placed within a small fraction of a wave length of each other. This is easy to do at telephone carrier frequencies where a wave length is thousands of feet long. The usual crossarm pin separation is satisfactory.

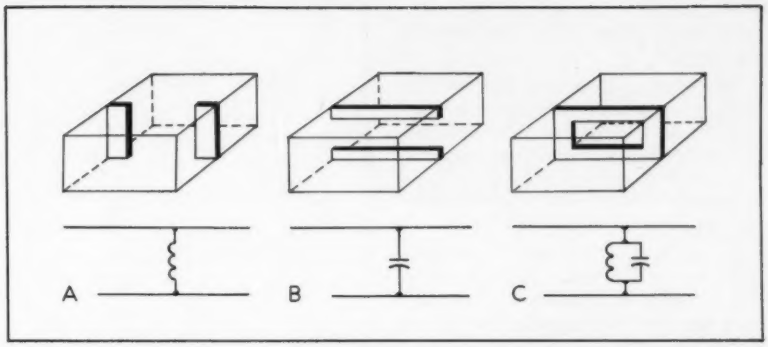


Fig. 2.3. Tuned circuits can be developed in wave guides by placing different shaped obstructions in the tube. Here are three different obstructions and their electrical equivalents.

However, in microwaves where the wave length may be an inch or less it becomes impractical to place the lines close enough together to avoid radiation. One attempt to solve these problems was the coaxial transmission line. This consisted of a tube or pipe with a conductor running down the middle. This overcame some of the disadvantages, but not all. The inside skin of the pipe which became one conductor had a large surface to offset the resistance loss; however, the center conductor being small did not have this large surface. In addition, some dielectric losses were still present because insulators or spacers were required to hold the central conductor in place.

The wave guide is a transmission line which consists basically of a rectangular metal tube. It has a critical dimension. Its width must exceed a half wave length at the frequency at which it is to be used. This dimension limits the lower frequency at which any wave

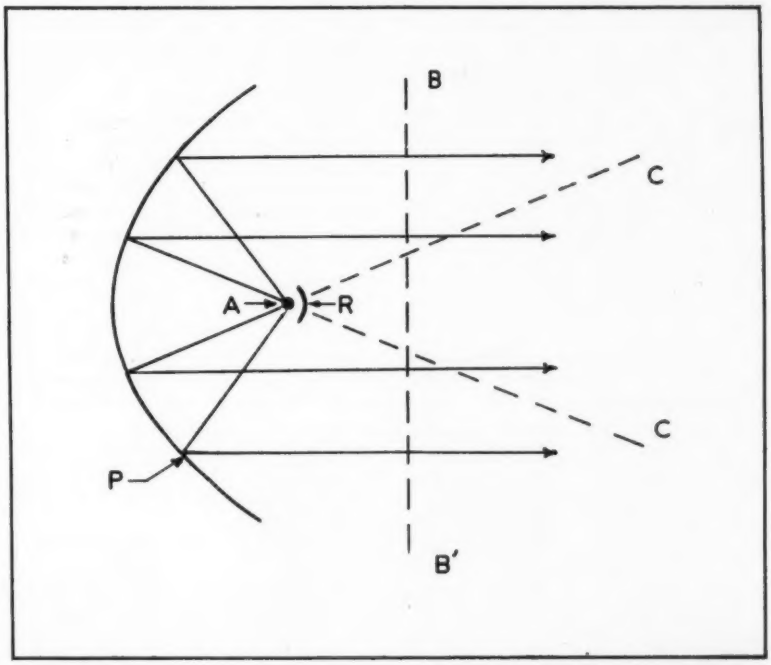


Fig. 2.4. The parabolic reflector. An antenna normally would radiate energy in a complete circle. In this equipment, the energy represented by the dotted lines C is blocked by the small reflector R. This energy along with the energy which normally would be sent out to the left, as shown by the solid lines from A, strikes the parabolic reflector P. The nature of the parabolic curve is such that all energy is then sent straight forward to the left. A sharp beam results, because the forward waves emerge parallel as they cross the line B-B'.

guide can be used, so for any given wave guide there is a "cut off frequency."

This critical dimension also restricts the frequency area in which it is practical to use wave guides. For example, at 10,000 megacycles a wave guide only one inch wide is required, but at broadcast frequencies a pipe 600 or 700 feet in diameter would be needed.

A number of attempts have been made to explain wave guide propagation in terms of ordinary transmission lines and their voltage and current relationships. Some of these explanations are not technically accurate. Perhaps one of the simplest and, at the same time, most accurate descriptions is shown in *Fig. 2.2.* Energy is usually coupled into a wave guide by means of a small probe or loop antenna. You might think of the propagation as being the result of two wave fronts coming from this antenna and bouncing back and forth down the walls of the wave guide. The angle at which these reflections take place is dependent upon the frequency being used. When too low a frequency is used the waves bounce directly back and forth and do not travel down the guide. This is what happens at the cut-off frequency.

An electric circuit can be thought of as having two sets of characteristics; one of which develops from the voltage and the other from the current. The voltage is the result of the number of electrons available; the pressure or potential as it were. The current develops from the number of these electrons that are in motion. When voltage is present on a conductor, an electric or electrostatic field results. When current is present, an electromagnetic field results. A radio or television antenna exhibits both of these fields, perpendicular to each other. The magnetic field is around the wire, the electric field is parallel to it.

These fields are also present in a wave guide and may form in a number of configurations. These are called modes. The modes fall into two general groups. One, the transverse magnetic (TM), has the magnetic field transverse to the direction of propagation. The other group is called the transverse electric (TE). This group has the electric field transverse to the direction of propagation.

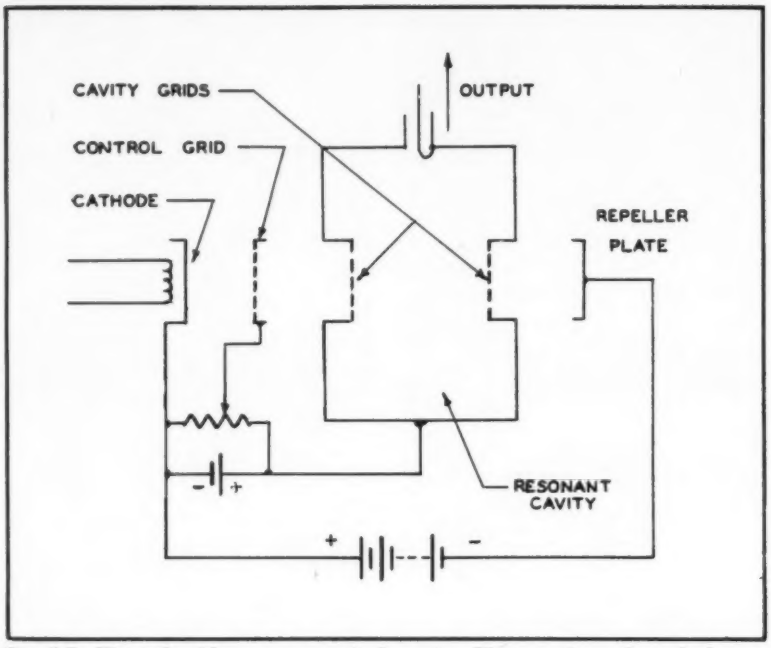


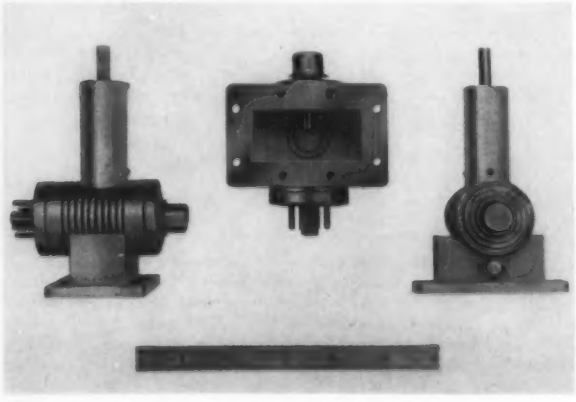
Fig. 2.5. The reflex klystron uses a single cavity. Electrons from the cathode pass through the grids on the cavity, but are repelled by the plate, which is at a negative potential. This results in oscillations in the cavity. The reflex klystron is used in low power applications.

Wave guides may be connected to other components by means of short lengths of coaxial cable, which terminate in small probes or loops which act as antennas. Some tubes and other parts have wave guide connectors or windows built right into them, so that the parts may be bolted together like high pressure pipe fittings.

The use of wave guides calls for new techniques in many simple electronic operations. For example, impedance matching may be done by means of a tuning stub. This would consist of a T-shaped piece of plumbing in which a short stub of wave guide would branch off from the main line. This stub would have a piston in it which could be pushed in and out, which would change the characteristics of the line. Even a small screw or probe projecting into a wave guide can cause reflections which will change the impedance.

A capacitive or inductive shunt can be created by placing small metal barriers in the tube, as shown in *Fig. 2.3.* Ferrite isolators can be made which will pass the microwave energy in one direction, but not in the opposite. These can be used for eliminating standing waves coming back from an antenna.

A device which steers microwaves around in wave guides, the circulator, was described in the Aug. 31, 1957 issue of TELEPHONY's Electronics Section.



Here are three different views of a small reflex klystron tube. (Eimac photo).

Antennas

If a single bare flashlight bulb were to be lighted in the middle of a darkened room, it would cast its feeble one or two candle power of light uniformly over the walls, floor and ceiling of that room. If a mirror were then held up to one side of the lamp, it would result in one-half of the room being completely darkened, but the other half would receive more light than it did before because it would be illuminated by both the bulb and the reflection of the bulb. If a curved, instead of a flat, mirror

(Please turn to page 36)

Courts and Commissions

Pacific T&T in Oregon Granted $759,097 Raise

A 6.35 per cent rate of return and a gross revenue increase of $759,097 were approved on Jan. 12 for Pacific Telephone & Telegraph Co. by the Oregon Public Utility Commissioner (TELEPHONY, June 21).

The commissioner made the increases applicable only to certain special services and equipment charges, and to business service in those cities where toll-free service has been provided in recent years.

In his order, the commissioner criticized the disparity in intrastate and interstate toll rates for calls of comparable distance.

The commissioner fixed Pacific T&T's rate base at $120,600,017, and on the rate of return allowed, net revenue requirements were found to be $7,658,101. Since net revenue had been $7,326,983, the company was allowed an additional $331,118 in net revenue. To realize this net increase, a gross revenue increase of $759,097 was necessary, the commissioner stated.

Pacific T&T had filed a rate base of $130,630,920 assignable to intrastate operations; it asked a 7.04 per cent return, and a $4,858,000 gross revenue increase.

The commissioner commented as follows on the company's rendition of Extended Area Service around metropolitan areas:

"The record also discloses that the company has in recent years embarked upon a program of providing toll-free extended area service adjacent to various metropolitan centers in Oregon. In each such case, rate-payers situated in the outer reaches of such areas have been required to pay higher rates to compensate the company for the loss of toll revenue formerly received.

"Rate-payers situated in the centers of these metropolitan areas, on the other hand, although they enjoy the same service and escape the imposition of the former tolls to an equal degree, have not been required by the company to pay additional or increased rates, and in this regard have been the recipients and beneficiaries of favored treatment....

"A serious problem of disparity in rates is therefore presently taking form in metropolitan areas and especially in the vicinity of Portland.

"Further, analysis of studies made by the company and by this office, indicates that the particular class of telephone users benefiting most from this developing situation are the metropolitan subscribers to business telephone service.

"These persons and firms have received, at no direct extra cost therefor, a most profitable expansion of the area in which they can quickly and cheaply conduct their respective businesses by telephone.

"The foregoing circumstances accordingly should be taken into account in the distribution of any rate increase among exchange service subscribers."

Pa. Independent Allowed Installation Rate Changes

The Pennsylvania Public Utility Commission on Jan. 7 approved the proposal of the Commonwealth Telephone Co., Dallas, to revise rates for business and home telephone installations (TELEPHONY, Dec. 20).

Under the new plan, which was to go into effect on Jan. 14, the company is dropping a $4.00 charge for installing extension telephones, if the work is done when a main telephone is installed.

The charge for installing new business telephones will be raised from $4.00 to $7.00. Although this will mean an increase in revenues of $1,287, the dropping of the home extension charges, it is estimated, will produce a $6,412 decrease.

Commonwealth furnishes service to about 55,000 subscribers. It said the home telephone change was made to "promote use of extra telephones."

Neb. Commission Revisions

The Nebraska Railway Commission has renamed Richard Larson chairman and discontinued the office of vice chairman, it was reported on Jan. 9. The commission also continued the appointment of Dee E. Butcher as secretary and separated the departments of engineering and accounting. E. A. Schmid was appointed chief engineer and head of air commerce. John A. Bonebright was named chief of accounting.

Tenn. Doctor Awarded $500 In Directory Omission Case

A Nashville, Tenn. physician, was awarded $500 damages in U. S. District Court recently, because of failure of the Southern Bell Telephone & Telegraph Co. to list him in the yellow pages of its directory.

The physician, Dr. W. Gilmer Reed, originally had sought damages in the amount of $10,000. He contended, before U. S. District Judge Robert L. Taylor, that he had an express contract with the company to be listed in the yellow pages of its directory, as a physician, and that the company's failure to do this for the period beginning April 1, 1957 and ending November, 1957, was a breach of its contract.

He charged that he had been deprived of $5,000 through the loss of old patients and an additional $5,000 from the loss of the natural increase in business he would have obtained.

Southern Bell contended that the listing of subscribers in the yellow pages of its directory is purely a gratuity and that, although it had expressly agreed to list the plaintiff, it was not liable to him for damages because the agreement was not supported by legal consideration. The company, according to a spokesman, also relied on the nonliability clause, which is a part of its directory at the beginning of the yellow pages.

Dr. Reed attempted to introduce evidence to show his business had not increased in the same proportion during the seven months in question as it had in the past. The court did not consider this type of evidence, stating it was too speculative.

The final judgment for $500 was based chiefly on the doctor's income figures, it was reported. In 1956 when his name was listed in the yellow pages, he earned $16,723. In 1956 his earnings dropped to $16,356.

O. Independent Asks Raise

A hearing was held before the Ohio Public Utilities Commission on Jan. 8 on the application of the Citizens Tele-

phone Co., Rock Creek, to increase rates. The company is asking permission to raise its one-party business rates from $6.00 to $7.00 and its one-party residence rates from $4.25 to $5.25.

General of Wis. To Offer Color Charge Option

The Wisconsin Public Service Commission on Jan. 8 authorized the General Telephone Co. of Wisconsin to offer their subscribers an optional rate on color telephones.

General's subscribers may now elect to pay either 25 cents as a recurring monthly charge for a three-year period, or a one-time charge of $7.50 when the telephone is installed. Prior to this, the rate was $7.50 at the time of installation.

OK Name Change in Ky.

The Kentucky Public Service Commission recently authorized the Mason County Telephone Co., Maysville, to change its name to the Kentucky Telephone Co. Since the company now also serves telephone properties in Kentucky counties, other than Mason, a name change was felt to be desirable, a company spokesman said. (See box on REA loans on page 15.)

Indiana Independent Sold to C. W. Thomas

Charles W. Thomas of Roachdale, Ind., has bought all of the common stock of the Hendricks Telephone Corp., Clayton, Ind., from G. B. Foscue of Wilmette, Ill., and the estate of Henry L. Winton, it was reported recently (TELEPHONY, Jan. 17).

Directors newly elected are: Mr. Thomas, Georgia L. and Grace M. Thomas, all of Roachdale; P. J. Lucier of Rochester, N. Y., and John C. Carvey of Indianapolis.

Mr. Thomas will be president and general manager.

General of SE Asks Stock, Bond Issue OK's in N. C.

General Telephone Co. of the Southeast, Durham, N. C., on Jan. 19 asked the North Carolina Utilities Commission to approve the sale of 250,000 shares of common stock at par value of $10 per share to its parent company, General Telephone Corp., and the issuance of 3.7 million dollars worth of first mortgage bonds which would mature in 30 years and bear interest not to exceed 5½ per cent.

Funds from the proposed financing, totaling 6.2 million dollars, would be used to pay off temporary short-term loans amounting to $6,115,000, and surplus funds would be used for further expansion and improvements of the company's service.

Minn. Independent Seeks Raise for Two Exchanges

A hearing on the application of the Dwelle Telephone Co., Lake City, before the Minnesota Railroad & Warehouse Commission was to have taken place on Jan. 22.

Present and proposed rates are as follows:

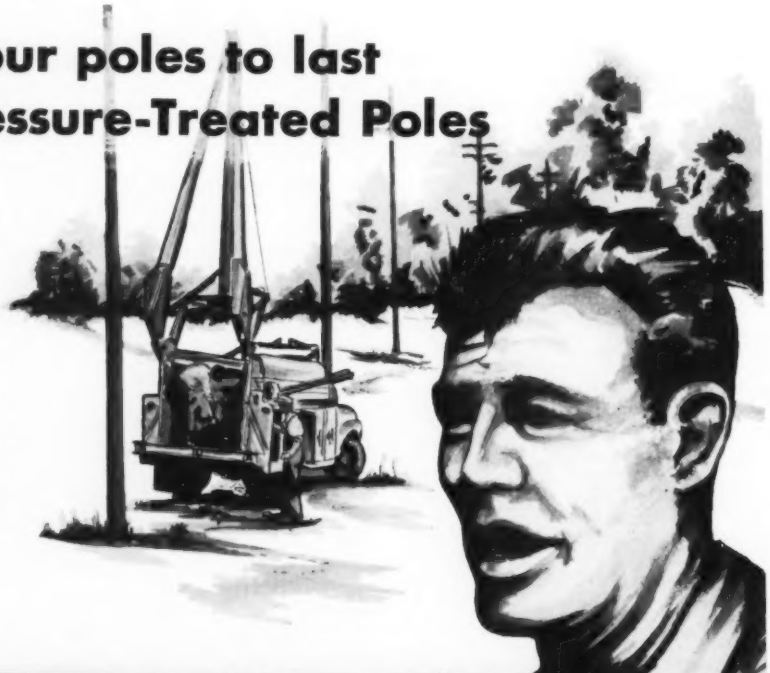
Lake City	*Present*	*Proposed*
One-party residence	$3.85	$5.00
Two-party residence	—	4.25
Four-party residence	2.70	3.50
Multi-party rural residence	3.35	4.25
Zumbro Falls		
One-party residence	3.00	4.50
Two-party residence	2.75	3.75
Four-party residence	2.25	3.00
Multi-party rural residence	2.75	3.50

The company pointed out that during the past five years it has invested $150,000 in new plant.

Gain Control of O. Company

A majority of the common stock of the Fayetteville (O.) Telephone Co. has

If you want your poles to last
Specify T-C Pressure-Treated Poles



Every pole bearing the T-C brand has received the best in preservation. "The T-C Treatment" makes them last, and give you generations of trouble-free service. Our pressure treating process (and we think you'll agree) is the best yet developed by modern Technology . . . and, only the best chemical preservatives are used. That's why we can say—Specify T-C and get the best in preservation.

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1 • Our new ACCO *ALUMINIZED* Telephone Wire, combining the strength of steel with the corrosion-resistance of a bonded coating of aluminum. Available in these grades: Best Best (BB); Grade 85; Grade 135; Grade 190 (Support Wire) and Steel Construction Wire.

2 • Our new ACCO *ALUMINIZED* Steel Strand, also with a bonded coating of corrosion-resisting aluminum. Made in 3-, 7- and 19-wire construction. Available in Common, Siemens-Martin, High Strength, Extra High Strength and Utility grades.

We consider the unique aluminized coating of these wires to be superior to Class C galvanizing—in longer service life under virtually all conditions. Yet, with all their advantages, you can buy them at *much lower prices!*

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By John L. Stewart, *California Institute of Technology.* Stressing modern, powerful pole-zero design methods, this book applies modern network theory to the understanding of vacuum tubes and feedback systems.

The author avoids use of abstract mathematics, yet gives data and design procedures of practical significance, discussing a wide variety of specific devices. The pole-zero design methods, given in easy-to-use form, show development of design for a large variety of circuits with and without vacuum tubes, and for systems with and without feedback. This book is a *must* for anyone interested in design and research in linear systems. **1956. 480 pages. 463 illus. $9.50.**

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You can't always pick the terrain over which service wires must be strung—but you can select guy and messenger wires that will hold lines in spite of high wind, snow and ice loading.

For long, trouble-free service, choose CF&I Galvanized Steel Strand. It is made of steel with exactly the right chemical and physical properties to assure high strength and easy workability. It is carefully drawn, cleaned and galvanized with a tightly-bonded coat of pure zinc to produce a corrosion-resistant finish that won't flake or peel, even when severely bent.

CF&I Galvanized Steel Strand meets or exceeds ASTM Specifications A-122 or A-363, or can be made in seven- or three-wire constructions to meet your specifications. Your nearby CF&I representative or local electrical distributor can give you complete details. Call him today.

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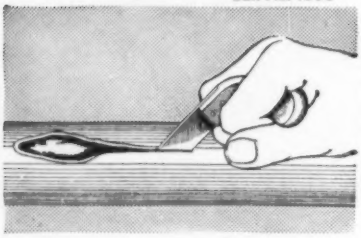

Here is a new tool developed by Klein, designed to slit insulation from flexible cords, PWC, telephone cable with vinyl or polyethylene jackets and bus drop.

Handle of cast aluminum, light in weight and with convenient grip; knife of tempered tool steel may be sharpened and is easily removed for replacement. This tool slits insulation from a few inches to as many feet as desired swiftly and simply. Does not damage conductors inside weatherproof sheath.

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been purchased by T. A. Heywood, it was announced recently by Henry L. Evans, president. The Fayetteville company serves 325 stations.

OK Loan in N. D. To Install Air Force Facilities

Souris River Telephone Mutual Aid Corp., Minot, has been granted permission by the North Dakota Public Service Commission to obtain a loan from Kellogg Credit Corp., it was reported on Jan. 8.

The funds will be used to finance work being done at the Minot Air Force base.

The mutual is presently constructing a cable plant to serve the administrative portion of the base. It also has authorization to build telephone facilities to serve the base housing project.

Ark. Company Effects Raise at 4 Exchanges

The Union Telephone Co., Smackover, which recently filed a request for a rate increase with the Arkansas Public Service Commission put the following rates into effect at four of its exchanges as of Jan. 1:

Smackover:	
One-party business	$8.25
One-party residence	4.70
Two-party residence	3.65
Four-party residence	2.80
Norphlet, Calion, and Mt. Holly:	
One-party business	7.25
One-party residence	4.20
Two-party residence	3.40
Four-party residence	2.80

SW Bell Gets Raise For Texas Exchange

Southwestern Bell Telephone Co. has been granted a rate increase by the Nacogdoches (Tex.) City Commission which is scheduled to go into effect Feb. 3.

Old and new rates are as follows:

	Old	*New*
One-party business	$11.00	$11.50
One-party residence	5.00	5.50
Two-party residence	4.00	4.25
Four-party residence	3.25	3.50

Request Purchase OK; Financing Approval in Mo.

The Missouri Public Service Commission on Jan. 21 was to have heard the application of the Civil Bend Telephone Co. to sell its property to the Inter-County Telephone Co., Gallatin.

Also in Missouri, a Feb. 27 hearing date was set on the application of the La Plata Telephone Co. for authority to issue $55,000 in first mortgage notes to Stromberg-Carlson Co.

General of SW Effects Increases in Tex. and Ark.

The following rate increases have gone into effect during the month of December for seven Texas and two Arkansas exchanges of the General Telephone Co. of the Southwest, the company reported recently:

Prescott, Ark. automatic conversion to 1,468 stations Dec. 7.	*Old*	*New*
One-party business	$6.50	$7.50
Two-party business	5.00	6.00
One-party residence	3.50	3.75
Two-party residence	2.75	3.25
Four-party residence	2.25	2.75

Louise, Tex., automatic, 208 stations Dec. 6.	*Old*	*New*
One-party business	$8.50	$10.00
Two-party business	7.00	8.00
One-party residence	4.75	5.25
Two-party residence	3.75	4.25

Daingerfield, Tex., C. B. Manual, 1,195 stations, Dec. 16.	*Old*	*New*
One-party business	$7.50	$10.00
Two-party business	6.25	8.50
One-party residence	4.25	5.00
Two-party residence	3.75	4.25
Four-party residence	3.50	3.75

Muleshoe, Tex., EAS, 1,454 stations, Dec. 26.	*Old*	*New*
One-party business	$7.00	$10.50
Two-party business	5.50	8.00
One-party residence	4.00	5.25
Two-party residence	3.25	4.50
Four-party residence	2.75	3.75

Post, Tex., C.B., manual, 1,332 stations, Dec. 1.	*Old*	*New*
One-party business	$7.75	$9.00
Two-party business	6.25	7.25
One-party residence	4.50	5.00
Two-party residence	3.75	4.00

Taft, Tex., conversion to automatic Dec. 29.	*Old*	*New*
One-party business	$8.50	$11.00
Two-party business	7.00	8.50
One-party residence	4.50	5.25
Two-party residence	3.50	4.25

Dalhart, Tex., conversion to automatic and EAS, 2,070 stations, Dec. 21	*Old*	*New*
One-party business	$8.25	$10.60
Two-party business	7.00	8.60
One-party residence	5.00	5.55
Two-party residence	4.35	4.80
Four-party residence	3.75	4.30

Augusta, Ark., conversion to automatic, 635 stations, Dec. 21.	*Old*	*New*
One-party business	$5.50	$7.50
Two-party business	4.00	6.00
One-party residence	3.00	3.75
Two-party residence	2.50	3.25

Ector, Tex., automatic additional EAS circuits, 129 stations, Dec. 11.	*Old*	*New*
One-party business	$6.50	$10.75
One-party residence	4.25	5.25
Two-party residence	—	4.50
Four-party residence	3.75	4.00

Approve Financing in Kan.

The Kansas Corporation Commission on Jan. 7 approved a $10,000 mortgage for the Drexel (Mo.) Telephone Co. with a Drexel bank. Part of the money is to be used to improve lines in Kansas.

PUBLIC ENTERPRISE

Concluded from page 20

corporations engaging in partisan support of candidates, I certainly think we should do the most we can—and that is more than we have been doing—to discuss policies and issues and call attention to their impact.

Speak The Truth

I hardly need to say how foolish it would be for any business to work along these lines on a merely self-serving basis. Only our own conviction that we speak the truth in the public interest will create conviction in others. But, if we have this conviction, and speak that truth—voluntarily and with courage—I am confident we shall be performing a public service and that our efforts will be so recognized.

To come back, in conclusion, to the telephone, I have one more very brief comment. All the time I've been standing here, I have been conscious of facing an audience that includes quite a few of the Bell System's best and biggest customers. But, whether you consider yourself a large customer or a small one, may I just say this:

We want all of you to like what you get from us. We want to make our service to you increasingly better. We shall never relax our efforts to bring that about.

I not only believe that the telephone will be more and more useful and valuable to you—I am certain that it will. And, I assure you that from that result will come our greatest satisfaction.

Texas Independent Gets New Rate Schedule

Winnie exchange subscribers of the Chambers County Telephone Co., Inc., Anahuac, Tex., have been notified of a new rate schedule effective Jan. 1. C. G. Mendenhall, company president, said that the increases were made necessary because of "a continuing increase in the cost of material and equipment—as well as labor and taxes."

The following are the new rates:

	Business	*Residence*
One-party	$10.00	$5.00
Two-party	8.00	4.50
Multi-party	6.00	4.00
Rural multi-party	7.00	4.00

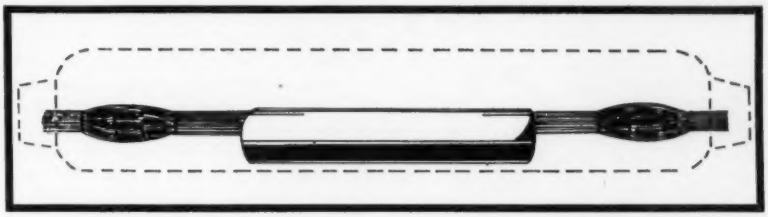
Ask Rate Raise in Wis.

The Wisconsin Public Service Commission on Jan. 26 was to have heard the application of the Urban Telephone Co., Clintonville, for authority to increase rates.

CEECO LOADING COILS

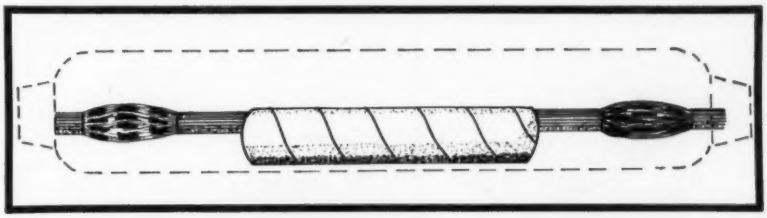
Units for Splicing Mounting

These assemblies are supplied on a wooden dowel, sometimes called sleeve mounted for use in the cable splice.



TYPE 162 FOR MOUNTING IN PLASTIC CABLE SPLICE

Type 162 assemblies can be supplied containing from one to 16 coils of either Type 632(88MH) or Type 638(44MH) and are for use in plastic cable splice. Types MF10, MF11, 641 and 642 coils can be furnished for inter office and toll entrance cables.



TYPE 167 FOR MOUNTING IN LEAD CABLE SPLICE

Type 167 assemblies can be supplied containing from one to 16 coils of either Type 632(88MH) or Type 638(44MH) coils and are for use in lead cable splice. Types MF10, MF11, 641 and 642 coils can be furnished for inter office and toll entrance cables.

CEECO assemblies give "Life like" voice transmission and reception to your long cable and rural distribution wire circuits. "Life like" telephone transmission is a clear, easily understandable telephone conversation over the necessary frequencies present in the voice to be heard via the telephone in the same volume as in "face to face" conversation. Telephone companies providing such quality service will increase subscribers desire to use "LONG DISTANCE" more often, thus increasing revenue.

Write us for assistance on your loading problems. CEECO loading coils are sold by your telephone equipment supplier.

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The antenna employed in Collins systems eliminates the mismatch problems inherent in standard paraboloids.

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The design also reduces undesirable sidelobe radiation and lends itself to easy adjustment.

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COLLINS

CREATIVE LEADER IN COMMUNICATION

MICROWAVE TECHNIQUES

Continued from page 30

were put next to the bulb, it would concentrate the light down to a small spot. All the rest of the room would be in darkness, but the small spot would have a dazzling brilliancy equivalent to a light of many candle power.

Similarly a transparent glass lens can be placed in front of a flashlight lamp and this too will focus the rays down into a small spot of greater intensity. Waves of other kinds can also be made to behave like light waves. They can be reflected, refracted, and diffracted by the use of appropriate materials. Thus, sound can be focused and concentrated in a beam by the use of a curved reflector made of a material which will reflect sound just as a silvered mirror reflects light. Also, radio waves can be made to change their direction by the use of antenna elements which will send them wherever they are wanted.

In radar equipment, sharp directivity was obtained by the use of many antennas mounted in front of a wire mesh reflector in the so-called bedspring array. These antennas were wired so that in a straight ahead direction all were in phase and aided each other. However, when viewed from a direction other than straight ahead, the antennas were out-of-phase and cancelled, hence the main beam of radar energy went straight ahead like a searchlight.

One of the basic principles of these reflection systems is that the efficiency increases with the size; i.e., the size as measured in half wave lengths at the frequency being used. The larger the reflector on a spotlight the more light it will catch and send forward. The more half wave antennas on a radar assembly, the sharper and stronger will be the beam.

A parabolic reflector such as shown in *Fig. 2.4* is one of the best that can be used for focusing energy into a beam. It is practical where wave lengths are short as with light and this shape has long been used in searchlights of all sorts. To be effective the reflector must be many wave lengths long, so it would be impractical to build at regular radio frequencies where the wave lengths might be several hundred feet.

At microwave frequencies, however, where waves are an inch or so long it becomes practical and is, today, widely used on telephone microwave systems.

Its operation is as follows: The antenna A would normally radiate a circular pattern in all directions. The small reflector R blocks the forward rays which would otherwise spread out in a wide pattern as shown by the dotted lines C. The energy which radiates backwards strikes the reflector and is sent forward as shown by the arrows. As the distance from the antenna to dotted line B is the same on all paths, a uniform wave front is presented which moves forward in straight lines like the beam of a searchlight. At the receiving end a similar parabola catches the beam and concentrates it down onto the receiving antenna.

So effective is this concentration of the power into a beam that only a watt or so of power is necessary to transmit microwave to line of sight distances.

This principle works in sound as well. This is the principle of the so-called "whispering galleries." If a building has a ceiling which is shaped parabolically at each end, whispers uttered at one end can be heard distinctly at the other, but not in between.

(Part III will appear next week.)

National Magazines Feature Telephone Industry

The publicity spotlight has recently been thrown on the telephone industry in two national monthly magazines.

In *Coronet* for February, Raymond J. Brady, in his "The Amazing Phone of the Future," describes a TV telephone, a wrist telephone receiver, Dataphone and dialing Paris in five seconds.

Francis Bello, *Fortune* magazine associate editor, in a two-part series in the November and December 1958 issues, discussed first "The World's Greatest Industrial Laboratory" and then "Tomorrow's Telephone System."

In the initial article, Bell Telephone Laboratories is said to be able to "put 1,000 men to work on a missile, or leave a few men alone to win a Nobel Prize." The second article treats the systems engineering required to interconnect the nation's, and especially Bell System, telephones; also the "rich variety of new services" made possible by the "speed and subtlety" of the transistor.

Britain-French Guiana Link

The British General Post Office recently announced, that as of Jan. 12, telephone service will be available with French Guiana. Calls will go by cable to Paris and then by radio.

An Incisive View

"Reputation is what men and women think of us; character is what God and angels know of us." — THOMAS PAINE.

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TELEPHONE SYSTEMS

manufactures LINE TREATMENT EQUIPMENT *for every carrier application*

CROSSOVER FREQUENCY	FILTER NUMBER	APPLICATION	CONTAINER/S
LINE FILTERS — GENERAL PURPOSE			
1.8 kc	F-1145	Speech-plus service	2 medium
2.0 kc	F-1126	Telegraph/OA	2 medium
2.1 kc	F-213	Speech-plus service	2 medium
2.4 kc	F-1153	Speech-plus service	2 medium
2.6 kc	F-851	Standard line filter	2 medium
3.0 kc	F-44	Standard line filter	2 medium
3.0 kc	F-68	5 chan. trunk or sub. ckts only	2 medium
4.0 kc	F-1119	Voice/OA-2, 3, 4.	2 medium
5.6 kc	F-1115	Voice/OA-2, 3, 4.	2 medium
5.6 kc	F-215	Voice/W.E.Co. "C"	2 medium
12.0 kc	F-74	B-37-1/B-37-2	2 medium
24.0 kc	F-75	B-37-2/B-37-3	2 medium
33.0 kc	F-1111	W.E.Co. "C"/W.E.Co. "J".	2 medium
34.5 kc	F-1152	W.E.Co. "C"/B-60J.	2 medium
37.0 kc	F-171	B-37-3/B-37-4.	2 medium
50.0 kc	F-224	B-37-4/B-37-5.	2 medium
64.0 kc	F-1102	B-37-5/B-60J-4 channels	2 medium
78.0 kc	F-1136	B-37/OC	2 medium
118.0 kc	F-1148	B-60JA/OD	2 medium
	A typical Lynch line filter is F-44 having a 3 kc cross-over. The response of this filter is flat to 600 kcs. Because of this superior frequency response, low intermodulation distortion and high power handling capabilities, this single filter will transfer any number of carrier channels above 3 kcs.		
"O" SYSTEMS FILTERS			
2.0 kc	F-1141	OA/Voice	4 medium
38.0 kc	F-1142	OA/OB	4 medium
78.0 kc	F-1143	OB/OC	4 medium
118.0 kc	F-1144	OC/OD	4 medium
W.E.Co. "C" SYSTEM ROOF FILTERS			
32.0 kc	F-1118	60 db rejection	1 medium
32.0 kc	F-1135	30 db rejection	1 medium
LONGITUDINAL SUPPRESSION FILTERS			
37.0 kc	F-1150	W.E.Co. "C" Systems	2 medium
115.0 kc	F-1147	"FM" Systems	2 med. & 1 small or 4 small
170.0 kc	F-1100	W.E.Co. "M" Systems	(same as F-1147)

WAYSTATION (BRIDGING) FILTERS...

Available for every conceivable requirement. The popular F-1158 Way Station Filter will reject carrier signaling tones at 3.5 kcs from voice frequencies below 3 kcs. Attenuation of the signaling tones at 3.5 kcs reaches 50 db on the transmission frequencies.

AUTOFORMERS...

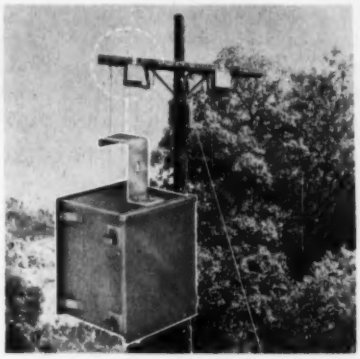
The wide range Lynch K-119 Pole Mounted Autoformer is used to obtain a compromise impedance match between toll cable pairs and 600 ohm open wire lead. Frequency range covers voice and carrier frequencies from 300 cps to 500 kcs.

REPEAT COILS...

Exceptional frequency response of the Lynch 2624 Repeat Coil varies less than ½ db from 100 cps to 1 mc. This identical design is used for an entire family of coils which provide all normal impedance ratios. Many more types of repeat coils, transformers and hybrids are also available.

TECHNICAL INFORMATION AVAILABLE...

For further information request the Lynch Equipment Characteristics Bulletin on Line Treatment Equipment (EC F02) and the Equipment Characteristics Bulletin on Waystation Filters (EC F01).

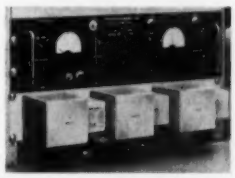


POLE MOUNTED FILTER ASSEMBLIES B-61

B-61 is a simply installed, cross-arm mounted, weather-proof assembly for use in applications where filters, repeat coils and balance networks must be located outdoors on a telephone pole.

B-61 comes complete with a wiring harness to provide external connections for 7 sub-assemblies (a maximum of 4 large and 3 small containers or 7 small containers.) It also has built-in carbon block protection. Any combination of line filters, repeat coils, etc., may be factory installed provided the containers specified do not exceed the capacity of the mounting plate.

YOUR ORDER FOR LYNCH LINE TREATMENT EQUIPMENT CAN BE SHIPPED WITHIN 30 DAYS

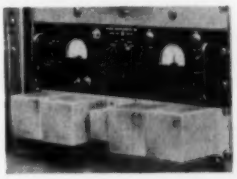


B-115 OFFICE MOUNTED FILTER ASSEMBLY

Inexpensive rack mounted filter assemblies complete with terminal strip and wiring harness. Available in two models, B-115 and B-115A.

B-115 mounts 6 containers, 3 of which may be medium containers.

B-115A mounts a maximum of 5 containers either medium or small size.



B-115A OFFICE MOUNTED FILTER ASSEMBLY

Lynch TELEPHONE SYSTEMS

LYNCH CARRIER SYSTEMS INC.
SAN FRANCISCO, CALIF.

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BUSINESS AND POLITICS

Concluded from page 13

We believe that, fundamentally, and in the long run, selling the public and keeping it sold, on the story of our private enterprise system and its accomplishments, is the best way to defeat those in and out of government who would weaken or destroy this system.

As our editor said in 1956, "given a clear-cut decision, we can rely on our American people to make the right choice. But, it must be a clear-cut decision. And, clear-cut decisions must depend upon plain, adequate and complete information."

With the composition of the present Congress, in which so-called "liberals" and business-baiters are said to have the whip-hand, and in view of the coming presidential election, it is imperative that we in the telephone industry, and those in other industries, get into politics to the extent that we go on the offensive and tell the American people and the politicians about the operations of the telephone business and the story of the private enterprise system. The private enterprise story is a wonderful story to tell. It's a story that will stand up in comparison with any other story about any other system of providing for the service and welfare of the public.

Gustav Hirsch, Consulting Engineer, Dies

GUSTAV HIRSCH, 82, nationally and internationally known engineering consultant in his capacity as president of the Gustav Hirsch Organization, Inc., died on Jan. 6 in Columbus, O., following two heart attacks.

Through the Gustav Hirsch Organization, he acted as consulting engineer for a group of Independent telephone companies in Ohio and various other states, and for certain military establishments. As such, these operations included preparation of appraisals, handling of rate matters and rate cases, preparation of plant and property records, depreciation studies, financial arrangements, operating boundary records, and appearances before regulatory commissions and courts.

Mr. Hirsch was born on Nov. 4, 1876, in Columbus, O. He attended schools there and graduated from Ohio State University in 1897, having studied mechanical and electrical engineering.

He began his business career with Cleveland (O.) Electric Illuminating Co., in 1897 in the meter and special engineering department. With time out for service in the Spanish American War, in 1899 he joined what was then the Columbus (O.) Citizens Telephone Co. as chief draftsman and resident engineer, in charge of the Reserve Construction Co., which performed the engineering work and construction of the Citizens company and the Franklin County Telephone Co.

GUSTAV HIRSCH

In 1902 he joined the Peoples Telephone Co., Detroit, Mich. He was chief engineer and assistant general superintendent, in charge of construction and engineering; also, during 1902-03 he was chief engineer and general superintendent of the Michigan Telephone Construction Co., Jackson, Mich.

Beginning in 1904, he was in partnership with Arthur Hoge, a civil engineer, in the Ideal Construction Co., Lima, O. This company specialized in construction of telephone, telegraph and street railway properties.

The Gustav Hirsch Organization was founded in 1908. Also, from 1908 to 1917, Mr. Hirsch was active in the management of the German-American Publishing Co., Columbus. From 1917 to 1919 he saw World War I service;

then he returned to the Gustav Hirsch Organization.

Mr. Hirsch served from 1892 till 1897 in the Ohio National Guard. In 1898 he joined the U. S. V. Signal Corps and served in the United States and Cuba during the Spanish American War. His Ohio National Guard membership resumed in 1899 and continued until 1902.

In World War I, his service included:

Major and division signal officer, 83rd division.

Commanding officer, 308th field signal battalion.

Major and commanding officer, 10th field signal battalion.

Major and lieutenant colonel, commanding 111th field signal battalion.

Lieutenant colonel and division signal officer, 36th division.

Commanding officer, 36th division.

Commanding officer, Camp Bowie, Tex.

Retired as: lieutenant colonel, U. S. Army.

Mr. Hirsch's service ribbons and medals included:

Spanish war medal and service ribbon.

Cuban occupation medal and service ribbon.

European overseas service—medal and service ribbon with two battle stars.

Verdun medal (French).

Ericsson medal (Sweden).

In addition to being president of the Gustav Hirsch Organization, Mr. Hirsch was affiliated with the following organizations:

Sky Way Broadcasting Corp., Columbus, Ohio; president and director.

Warren (O.) Telephone Co.; president and director.

The Conneaut (O.) Telephone Co.; vice president and director.

United Utilities, Inc., Abilene, Kan.; vice president and director.

The Mansfield Telephone Co.; vice president and director.

The Elyria (O.) Telephone Co.; assistant secretary and director.

Cosmo Investors Corp., Newark, O.; director.

Jaeger Machine Co., Columbus; director.

Ohio Independent Telephone Association; director.

Ohio Mental Health Association, Columbus; director.

Mr. Hirsch was listed in "Who's Who in Engineering," "Who's Who in America," and "Who's Who in Industry."

He is survived by his daughter, Irene Dorothea. His wife preceded him in death in 1954.

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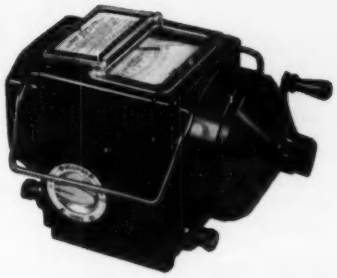
Whether it's maintenance, rehabilitation, or special development work, there's a dependable Biddle instrument practically made-to-order for any electrical testing job you face. It's good to know all about these fine instruments . . .

Have you sent for the latest literature?



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are the most generally accepted devices in the world for detecting incipient weaknesses in the insulation of nearly all types of electrical equipment.

Pictured here is the Meg type of Megger Insulation Tester—the most popular instrument in our line. Like all Megger Testers it contains its own power supply in the form of a hand generator —no batteries to let you down. This is a 400 v. instrument with a discharge switch.

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BULLETIN 21-45-T

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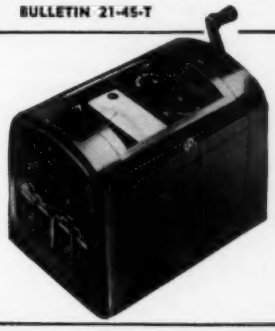
measure the resistance to earth of ground connections simply, easily and accurately, and thereby help to determine whether such connections will perform the services for which they were designed and installed.

Pictured here is the CVM type of Megger Ground Tester. For complete information on all ranges and types of ground testers write for

BULLETIN 25-T



FRAHM® FREQUENCY METERS

Frequency measurements are made easy with this miniature portable Frahm Resonant Reed Frequency Meter. Vibrating reed tips form a pulsating pattern that makes it easy to read alternating current frequency from 15 to 1500 cycles per second.

Meter is applicable to pulsating or interrupted D-C as well as A-C supply circuits. Sturdy — no delicate pivots, jewels or moving parts. Remains relatively unaffected by external fields and is independent of load, power factor or phase shifts in supply circuit. Available in switchboard, miniature and portable types. Model illustrated is used for checking bell-ringers.

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The High Tensile Wire with BUILT IN Safety Factor

Crapo HTL-135

COMPARE THE PHYSICAL VALUES!

Diameter (inches)	.109
Breaking Strength (pounds)	
Rated (minimum)	1213
Average of actual tests	1350
Fatigue Endurance Strength	
In Pounds	466
In % of Ultimate Tensile Strength	35%
Elongation in 10 inches	4 to 8%

By every rule of sound engineering practice, *Crapo* HTL-135 High Tensile Telephone Wire has proved to be the most dependable and economical conductor available for long-span rural lines.

Recommended sags and tensions for this rugged, high strength wire are based on accurately determined stress strain characteristics and on maintaining loads specified by the National Electric Safety Code. Initial unloaded tensions at the lowest temperature expected never exceed the fatigue endurance limit of the wire.

Crapo HTL-135 makes possible spans to 350 feet in Heavy Loading, 540 feet in Medium Loading and 650 feet and over in Light Loading Districts with a proven margin of safety.

Electrically, *Crapo* HTL-135 provides more than ample conductivity for typical subscriber lines in rural areas. Loops of 14 to 15 miles are practical with normal voltages and equipment. Longer loops are possible where higher voltages and more sensitive telephone sets are employed. This wire also is being used successfully with subscriber carrier current installations.

For low initial cost, low maintenance cost and all 'round reliability, insist upon the strength and high fatigue endurance characteristics provided by *Crapo* HTL-135! Write for Manual N-53 containing complete engineering data!

IN THE NATION'S CAPITAL

Continued from page 15

service to the customer far exceeds the cost. But it may not always be that way, as the gas utilities found out three decades ago, when they were on a manufactured gas basis trying to compete with a fast-growing electric industry. Since then the natural gas pipelines have put them back in business.

Anyhow, the American Railway Labor Executives Association (ARLEA) is denouncing what it regards as the unjustified abandonment of passenger service by the railroads. Within the past year, for example, the Baltimore & Ohio suspended all passenger trains between Washington, D. C., and New York; and the Lehigh Valley wants to discontinue its passenger service altogether and will probably be allowed to do so by the Interstate Commerce Commission (ICC).

The fact is, however, the increasing labor costs as well as automobile competition have made the rails disposed to get out of the business of carrying passengers. Twenty-three chiefs of railroad unions met in mid-January in Washington, and decided on a tough fight against the reduction in passenger train services, now going on apace. The union leaders said they would attempt to stop the "unjustified" abandonment of trains, but the general tone of their statement indicated they think most curtailments are "unjustified." They will pitch their campaign on what they call the railroads' "obligation to meet the traveling and shipping needs of the nation."

The main reason behind this reduction in service is money. The railroads have been losing heavily on passenger trains—costs are higher than passenger income. One of the factors responsible for the heavy losses and the rails' inability to keep fares at a competitive level is high labor costs. But the union chiefs, in announcing their campaign, made no mention of featherbedding.

It stands to reason, of course, that if there were any money to be made by the railroad management, in continuing or expanding passenger operations, they would not have to be told by the unions to stay in the passenger transportation business. They would be way out ahead of labor unions, or anybody else, chasing the consumer's dollar. It is because, therefore, passenger service has become too expensive to bother with that the railroads are voluntarily giving it up.

The figures speak for themselves. And it is naturally going to be hard on labor just as it is hard on those

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FOR THE FINEST

who invest in railroad securities with the hope of a profit. Some 348,182 railroad jobs disappeared between March, 1953, and March, 1958. Disappearance of a good many more will be shown in the 1959 figures as they become available. The loss of railroad employment in a country which is growing in almost every other way continues at an average of around 5,000 jobs a year.

Now, let us take a look at the people who make hats. In 1951, there were 17,700 people making felt hats in the United States. In September, 1958 there were 9,900, a drop of nearly one-half.

How do the two union groups—railway labor and the hat makers—intend to go about remedying this situation? The answer is a study in contrasts. The railway labor answer was to blast management. ARLEA Chairman G. E. Leighty accused the rail management of having lost "all sense of any obligation to the public." Previously the ARLEA had blasted predictions of an ICC examiner, Howard Hosmer, who said that "in another decade or so" passenger service would be all gone. The association was particularly indignant at Mr. Hosmer's suggestion that the union's demands played any part in the troubles of the rails. "The (Hosmer) report has adopted a railroad propaganda line," the statement claimed.

But, the ARLEA can suggest no alternative for keeping the passenger trains running, outside of tax subsidy and more regimentation of an industry which has already been regulated into more red ink than it can stomach.

The approach of the United Hatters, Cap, and Millinery Workers' International Union is quite exceptional. This union believes in hats. It believes that if its own members would wear hats, and should tell everybody else to wear hats, and keep on that line, there would be some results. And, so, this union is investing $300,000 of its own money in a failing Massachusetts hat factory. This factory, which has been in business for a century, is now closing down for lack of profits because American men and boys in increasing numbers are running around without hats.

If there is any truth in the cynical maxim that a man will put his money where his real interest lies, the hatmakers are at least sincere in their conviction. The union executives will have a majority of members on the board of directors and a union man will become treasurer.

And, so, while the railroad labor group calls for more regimentation and discipline of management, the hatmakers labor group is turning *itself* into management itself. It is going to underwrite the making of hats and back the hatmakers' job with union funds. Under such a situation, it is probable that the hat union executives, once involved in their Massachusetts operations, are more likely than the rail unions to take advice which a Senate committee offered the rail unions a few months back: "There should be reappraisal of the entire . . . labor situation in the light of the present plight of the railroads."

FCC Annual Report

Earlier this month the FCC released its 24th annual report for the fiscal year 1958. This means that the report covers only half of the calendar year of 1958. Most of the 182 pages were taken up with a recital and description of FCC organization and activities. While this was very interesting and authoritative as far as it went, there was very little real news in the document. Summarizing the telephone business under its jurisdiction, the FCC made the following general observations:

"The domestic telephone industry (Bell and Independents) has become a 22 billion dollar investment. Its gross revenues exceed 7 billion dollars.

"Telephones in use are nearing 64 million. They handle nearly 240 million calls daily.

"Dial operation is possible on 92 per cent of the Bell and 75 per cent of the Independent telephones. Some five million Bell subscribers can dial toll calls to 30 million other telephones.

"The long lines telephone system has expanded to 32 billion circuit miles, of which about 11 million are radio and a similar amount is coaxial cable.

"Common carrier service is furnished by over 700 two-way land mobile systems and is being tested for passengers on aircraft in flight.

"More than 100 one-way signaling systems are used for paging purposes."

Regarding its specific activities in the telephone field, the report discussed a variety of pending matters, such as Bell acquisition cases, construction of interstate facilities, mobile radio, private line service rates, depreciation, pensions, and uniform accounting. Because this data is now a little over six months old, there is hardly much point in repeating what was said, except to note that official documentation by the FCC is now available. This is what the report said on common carrier microwave frequency problems:

"*Common carrier microwave radio frequency problems.* To satisfy vital national defense frequency requirements, a frequency reallocation effected by commission order on Apr. 16, 1958, precluded further common carrier radio

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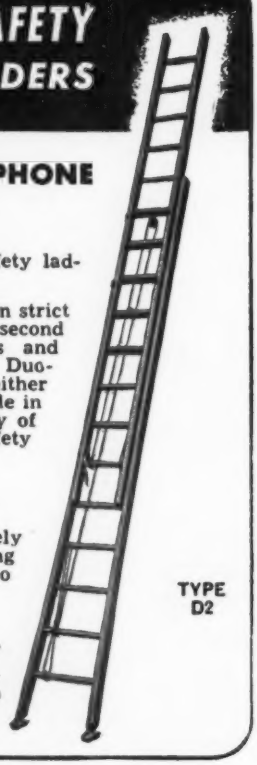

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Here's one fine example of the many Duo-Safety ladders ideal for telephone maintenance work.

Type D — a truly great extension ladder built in strict accordance with safety regulations. Rungs are second growth hickory, reinforced with steel rods and equipped with special automatic locks and Duo-Safety's famous Safety Shoes. Made with either straight or parallel side rails. Type D is available in one, two or three sections — in a large variety of sizes. Write for free catalog on all Duo-Safety ladders.

IMMEDIATE DELIVERIES!

Duo-Safety ladders will be shipped immediately upon receipt of order! A planned stock-piling program assures really fast action — there's no delay the Duo-Safety way!

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assignments in the frequency bands 890-940 and 3500-3700 megacycles and provided certain restrictions on prior authorized operating facilities in these bands. The commission is attempting to determine what action, if any, can be taken to alleviate the resulting hardships created for common carriers in relation to their message telephone, data transmission, and other operations."

On the subject of common carrier land mobile radio service the following comments in the report might be of passing interest:

"Forty-two new miscellaneous common carrier land mobile radio systems for two-way communication service were granted during the year, in addition to 18 new radio systems for one-way signaling (radio-paging) service. At the year's close, 316 two-way communications systems held licenses, and permits for 25 new systems were outstanding. At that time there were also 91 licensed one-way signaling stations and nine new stations under construction.

"Forty new land mobile radio systems were authorized for general communications common carriers (telephone companies) for two-way land mobile radio service. As of June 30, 1958, there were 359 such systems licensed and 36 new systems under construction. During the year, several Independent telephone companies tried out fully dial-operated land mobile radio systems which were developed by various radio equipment manufacturers.

"Rural radio-telephone service—The Rural Radio Service is intended to provide domestic public communication to points where it is not practical to construct wire lines. Ninety-three new stations were authorized during the year. At its close, there were 293 licensed stations and 14 new stations under construction. Of the total, 33 were central office stations, 70 were interoffice stations and 204 were rural subscriber stations. This represents a growth of 38 per cent during the last fiscal year. Additional frequencies, shared with other radio services, were made available to this service in Puerto Rico and the Virgin Islands."

Fantastic advances lie ahead in communications, the FCC report predicts. Among many new ideas, it said visual telephony is within the range of possibility as well as international television through use of the upper layers of the atmosphere. The FCC foresees widening use of radio by private business and individuals as more and more radio interference problems are eliminated. "No other nation has made such progress in telecommunications," the FCC declared. "Service in this country far surpasses that anywhere on the globe."

THE PLANT MAN'S NOTEBOOK

Concluded from page 17

heavy open wire leads being replaced by cable.

The entire trip proved most enjoyable to the Blains. The dogs enjoyed everything except the sand burs of Texas. They would set up a terrible howl when these got in their pads and finally refused to walk on the grass at all.

We did not encounter a single motel during the entire trip that objected to our pets. The little booklet, "Touring with Touser," published by the Gaines Dog Research Center in New York City, was of considerable help in many towns in which we stopped. When we stopped for the night and signed up for a motel, the dogs could not wait to inspect their new quarters and if it did not have wall-to-wall carpet and a TV, they were most unhappy. They were unhappy, too, when we stayed longer than one night at a particular spot, and were decidedly pleased to get moving again. It was the "gypsy" in them or perhaps they have developed into common tramps.

Mickey enjoyed several "firsts" that were foreign to our eastern states. These included cotton growing in the field, broom corn, tumble weeds, devil claws and soap weeds. The large chicken hawks and the red hills of Oklahoma proved most interesting. She was also surprised to see that the Indians dressed just like other people, and wore no feathers.

We certainly enjoyed every minute of our trip, met many charming and interesting people, and saw many unusual things. Although it is far too early to make plans for next year, we are sure to give some thought to a similar excursion before a definite decision to remain home and comply with the normal prescribed deportment and usual activities of the season.

Carolina Telephone Tells General Office Promotions

Two appointments to positions within the general commercial office at Carolina Telephone & Telegraph Co. headquarters, Tarboro, N. C., have been made.

W. W. Aycock was named special services manager and E. P. Kittinger, general commercial supervisor.

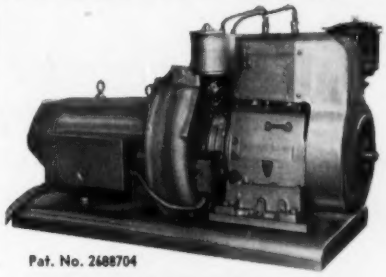
Announcement of the appointments was made by general commercial manager C. J. Logan.

Mr. Aycock was formerly general commercial staff assistant.

Mr. Kittinger was recently assigned to the commercial department following work in setting up the plant department's sales program.

NO DROOP DROP or BREAK

AMAZING U.S. MICRO-POWER



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Toll revenues are

Get your share with *LENKURT* MICROWAVE and CARRIER

—an integrated package— engineered by telephone people for telephone plant!

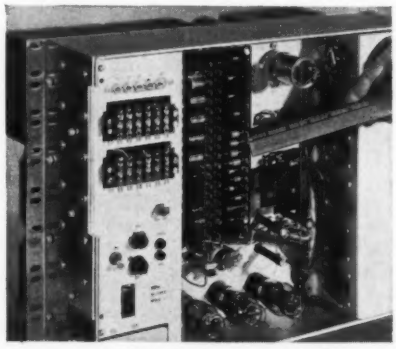
TOLL BUSINESS is growing by leaps and bounds—and more and more telephone companies are making sizable revenue gains with Lenkurt Radio and Carrier systems.

In many cases, carrier alone is used for economical multichannel service over existing wire lines or cable. In other cases, radio is the low-cost answer. Microwave can be quickly and inexpensively installed—with far less labor—and no right-of-way expense.

Lenkurt Microwave, like Lenkurt Carrier, meets the exacting needs of the telephone industry—with highly reliable, toll quality transmission. It is flexible, economical and practical for small as well as large channel groups—often proves in at distances of even 15 miles or less—is simple and easy to maintain.

For circuits into new territory—for additional channels beyond the capacity of existing circuits—for utmost dependability under all weather conditions—look into new Lenkurt *Microtel*. And remember, you can obtain *Microtel*, with compatible Lenkurt Carrier, in a complete package from a single source—*engineered, furnished and installed*, on one order, from Automatic Electric.

Basic terminal of Lenkurt *Microtel* consisting of a transmitter, receiver and power supplies.



Power supply for the transmitting and receiving klystrons. The only active components in this supply are the three voltage regulator tubes.

booming!

new *Lenkurt* microtel type 74A

Latest achievement in high-quality radio transmission for telephone use, this new Lenkurt system operates in the 5925-6425 mc common carrier band. Clean in design, reliable and highly flexible, it meets the needs of telephone companies of all sizes. With Lenkurt 45BX Carrier, a single terminal can accommodate from 4 to 240 channels. With 8 transmitters and receivers operating over a common path, the *Microtel* system can handle up to 1920 voice channels, plus 128 or more supervisory, remote-control or telemetering channels.

Look at these important features:

- **Easy to install**—Standard 19-inch rack mounting; compact plug-in construction; back-to-back installation saves costly floor space.
- **Easy to maintain**—Miniaturized plug-in components similar to Lenkurt 45-class equipment; all components accessible from front; built-in test facilities.
- **Less power consumption**—Fewer tubes; operates from standard office battery supplies or from 115-volt a.c. mains.
- **Stand-by flexibility**—Frequency diversity or space diversity; combining or transfer facilities.
- **Economical expansion**—With r-f circulators 2, 3 or 4 terminals can be added to same antenna system—and Type 74A equipment uses smaller antenna.
- **Automatic switching**—Permits unattended operation; back-to-back terminal equipment permits dropping and reinserting of channel groups at repeater points.
- **System length**—Up to 300 miles with medium loading and multiple repeater points.

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Subsidiary of GENERAL TELEPHONE

Attending L. M. Berry & Co.'s annual management conference in Dayton were (FIRST ROW, left to right): W. J. McGirl, southern sales manager; H. F. Scott, mid-western territory manager; J. P. White, southern manager; John W. Berry, general sales manager; Loren M. Berry; W. A. Steuer, general manager; F. L. Hawker, eastern manager; J. W. Craig Jr., general sales supervisor; W. L. Wolcott, personnel and training director; J. P. Fraim, executive assistant. SECOND ROW: T. A. Calhoun, special representative; S. H. Rainey, general training manager; J. E. Whalen, Wisconsin division administrative manager; M. F. Feeney, Louisiana division sales manager; H. L. Boebel, Mississippi division manager; J. D. Bristow, mid-western division supervisor; N. E. Robinson, Ohio division manager; E. W. Beaney, New York division supervisor; L. G. Laughlin, mid-eastern division sales supervisor; J. D. Beckham, southern personnel manager; Phil Engle, general art director. THIRD ROW: R. E. Shearer, general sales assistant; C. W. Peasley, Wisconsin division sales manager-state; S. E. Phillips, mid-western territory staff assistant; R. J. Burke, general art supervisor; W. R. Calhoun, auditor; J. W. Egnor, sales promotion supervisor; C. A. Smith, Tennessee division manager; H. C. Evans, mid-western division manager; J. J. Mullin, personnel methods supervisor; R. W. Brundige, sales promotion manager; B. D. Addington, mid-eastern division manager. FOURTH ROW: J. C. Grimes, Ohio division supervisor; J. L. Bowling, Florida division supervisor; R. A. Maner, Florida division manager; R. W. Aleff, Wisconsin division sales manager—Milwaukee; A. W. Derbins, Shreveport district sales manager; L. E. Hurrelbrink, Alabama division supervisor; R. H. Eshelman, Louisiana division manager; W. C. Welch, Kentucky division manager; R. T. Davis, Pennsylvania division manager; J. B. Bowen, Alabama division manager; J. W. Nagel, New York division manager; K. R. Jeffers, Western division manager; E. F. Tinnerman, Wisconsin division manager; W. C. Fish, general sales training supervisor; H. C. Hull, statistician, and J. M. Bayley, eastern sales manager.

L. M. Berry Holds Annual Management Conference

"Results in 1959" keynoted L. M. Berry & Co.'s annual management conference in Dayton, O., in December, as 47 territory managers, division managers, division supervisors, general office personnel, and general sales staff members met to set the pattern for increased directory sales and service for the coming year.

Opening the four-day conference by introducing the new theme for the year, "For Results To Count In '59, Get Them On The Bottom Line," John W. Berry, general sales manager, stressed the importance of getting the results where they count—on the bottom line of advertising sales contracts and progress reports. By focusing attention on results that count, he explained, the company would be able to increase revenues and meet the expectations of the more than 275 telephone companies it serves. He then reviewed the company's sales efforts of 1958, and outlined the objectives for 1959.

W. L. Wolcott, personnel and training director, then discussed the sales personnel picture, after which he introduced and explained a procurement and employment practice and guide, which will be used by division managers as a reference in securing qualified sales personnel. This was followed by a talk from S. H. Rainey, general training manager, who discussed initial sales training from the standpoint of field coordination and follow-through.

R. W. Brundige, sales promotion manager, then discussed new, revised, and proposed sales aids, after which he introduced various classification filing systems under consideration, proposed to aid sales personnel in planning accounts more effectively and efficiently.

The second day of the meeting was opened by Phil Engel, general art director, who discussed the use and results of specially prepared "spec" copy, which is being supplied to sales personnel by the general art department.

He was followed by J. W. Craig Jr., general sales supervisor, who presented a discussion on salesmen's planning. Emphasizing completeness and thoroughness, he made recommendations as to how the planning of accounts can be improved in 1959.

R. E. Shearer, general sales assistant, then spoke on canvass and specialized account planning, and gave examples of how classification material can be used in creating effective sales aids.

Mr. Wolcott began the third day of talks by introducing the company's new management development program, detailing the steps required in the selection procedure of trainees for management positions. He was followed by R. J. Burke, general art supervisor, who pointed out significant sales factors brought to light in continuing art production study. Mr. Craig then presented "Supervision and Attitude in '58," in which he stressed management and supervisory responsibilities that must be met in the coming year.

He was followed by Mr. Brundige, who unveiled the company's sales incentive program for 1959. Highlighting this talk was the announcement of a new supervisors' contest, which will enable supervisors to compete for honors and prizes on the basis of canvass results. He also announced that several vacation trips are being offered this year in the sales contest, in addition to the usual merchandise prizes offered for outstanding sales achievement.

J. J. Mullin, personnel methods supervisor, opened the final day of the conclave by discussing "The Office Manager's Job" from the viewpoints of

building the work team, administration, and production. He then compared clerical performance of 1958 to 1957, and detailed office projects and objectives for 1959. Mr. Rainey followed with a talk on the problems involved in the evaluation of sales applicants, and made suggestions for improvement of evaluation techniques.

Delivering the final address of the conference, General Sales Manager Berry detailed the role of management in the future development of the company, and placed emphasis on the areas of improvement in all phases of company operations which will be required to secure the objectives set forth for the coming year.

This meeting will be followed by conferences in each of L. M. Berry & Co.'s 13 divisions, where the plans and objectives formulated in Dayton for 1959 will be presented to supervisory personnel.

ITT to Develop TV System Transmitting Defense Data

Defense Department officials in the Pentagon in Washington may soon watch activities at Strategic Air Command (SAC) headquarters in Omaha, Neb., over special television equipment utilizing ordinary telephone lines.

International Telephone & Telegraph Corp. has received a development contract for the construction of a television communications system capable of sending a televised picture of coded data from SAC to Washington 1,100 miles away.

The contract was awarded to ITT Laboratories at Fort Wayne, Ind., by the Rome Air Development Center, N.Y.

The system would transmit such information as briefing boards, aircraft position, printed material and other secret SAC data. The information first would be televised in Omaha with a standard TV camera, which relays the signals to the transmitting console. The picture would then undergo a series of changes and adjustments so that it could be transmitted over low-frequency telephone wires.

Before entering the telephone lines, however, electronic picture impulses are coded much like teletype messages. The original scene televised at SAC then travels over the hundreds of miles of telephone lines before being reconverted and decoded for viewing on a standard TV monitor in the Pentagon. The codes may be changed daily—even hourly—if necessary.

Audio lines operating concurrently with the televised lines will permit defense officials in Washington to view and discuss the important events at SAC virtually as they occur.

CEC Systems Division Becomes Subsidiary Company

The board of directors of Consolidated Electrodynamics Corp. has approved a plan to incorporate the company's systems division and to operate it as a wholly owned subsidiary of the parent corporation, it was announced on Jan. 15 by Philip S. Fogg, CEC president and board chairman.

The new company will be called the Consolidated Systems Corp.

CEC's systems division is located in a recently completed 57,500-square-foot plant in Monrovia, Cal. It employs approximately 400 people who are engaged in the design, development and manufacture of custom-engineered instrumentation systems for high-speed electronic data processing, industrial control, chemical analysis, and dynamic and static testing.

Rex Names Harold Prouty Telephone Division Head

The Rex Corp., acquired in March 1958 by the American Enka Corp., one of the 500 largest U.S. companies—announces that it has been separated into four operating divisions.

One of these is the telephone division which supplies telephone wire and cable to Independent telephone companies and to Western Electric Co. Harold Prouty was appointed to head this division with Robert Kiernan his assistant.

The Rexolite division has responsibility for ultra-high frequency insulation material; low-dissipation, radiation-resistant thermosetting styrene co-polymer, a proprietary Rex product with dielectric and machining characteristics that make it suitable for a range of applications from connectors and printed circuits (copper-clad Rexolite) to specialized uses in the ballistic missile early warning system. Howard Pendergast, who also is technical director of Rex, was appointed manager of this division.

Rex's aircraft and electronics division concentrates on wire, cable and control components for aircraft, missiles, satellites, etc. George Batchelder was recently named chief of this division.

In the Rextrude division, the company has grouped a specialized line of plastic extrusions. Thomas Cody has been appointed to head this division.

North Changes Appointment

Because of a change in plans, North Electric Co., Galion, O., has announced that Robert Olmutz has been appointed assistant sales promotion manager in charge of Ericofon promotion. It had been previously announced in the Jan. 24 issue of TELEPHONY that Mr. Olmutz had been appointed a regional salesman.

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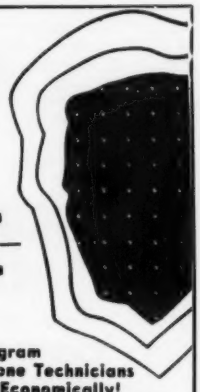

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OUTSIDE PLANT construction supervisors and staking foremen, location Wisconsin. REA telephone experience required. Write Carl C. Crane, Inc., 2702 Monroe St., Madison 5, Wis.

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